MAY 1939

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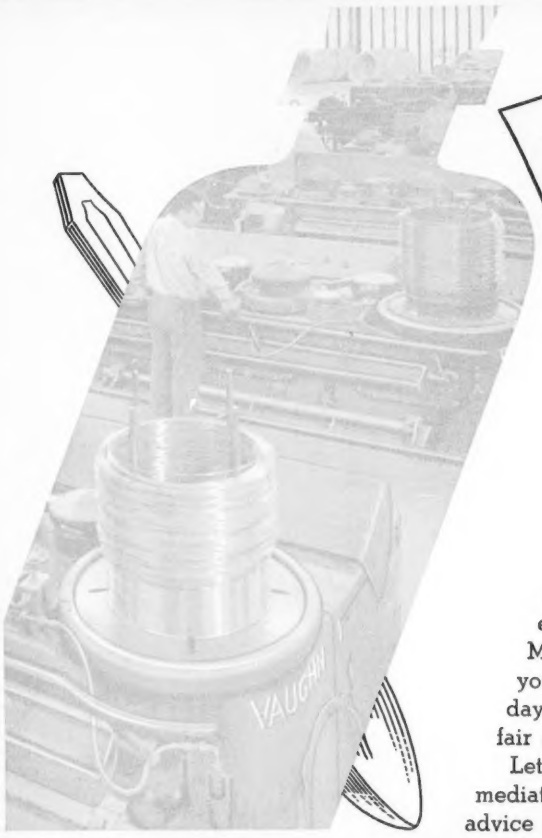

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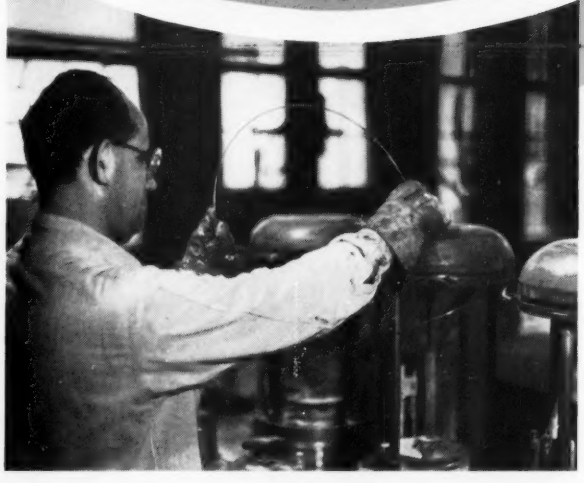

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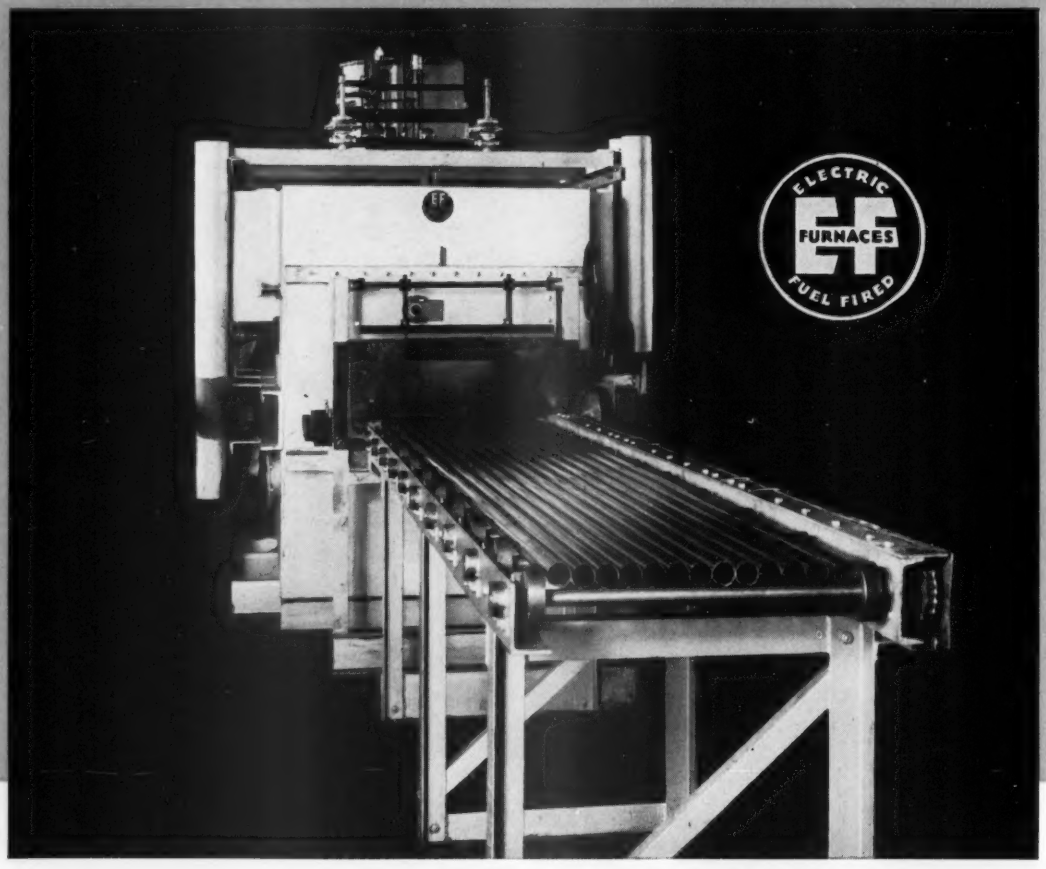

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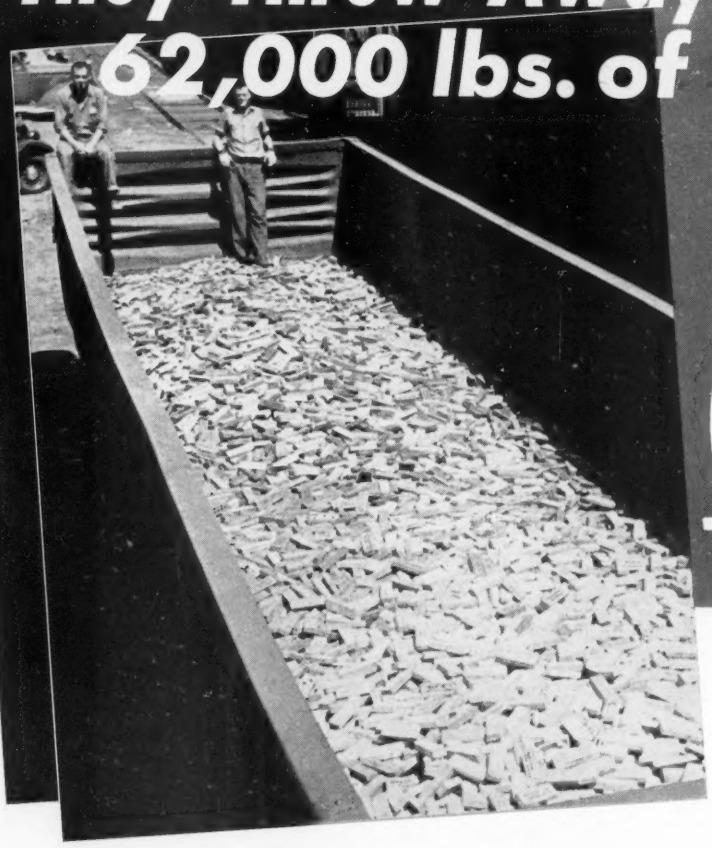

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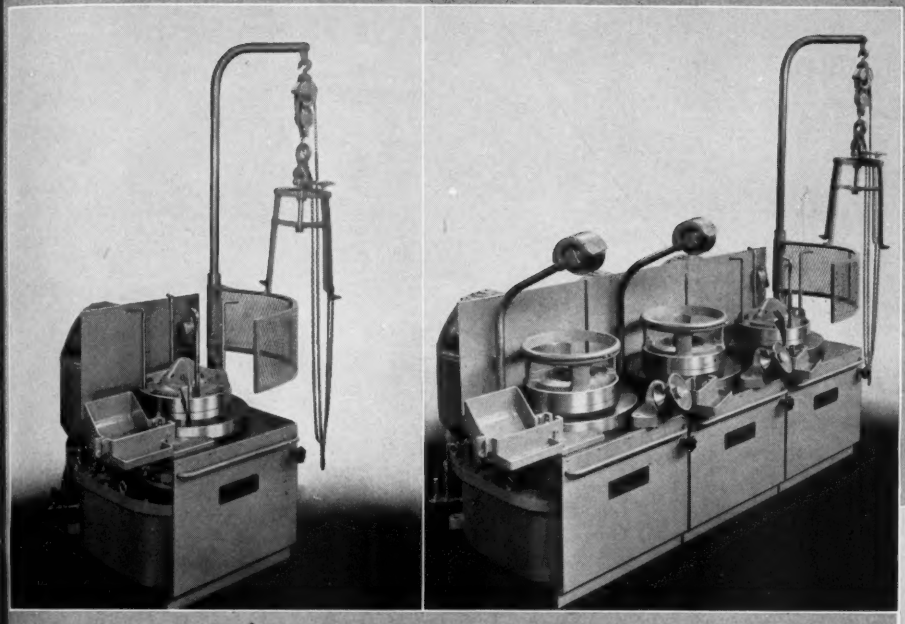

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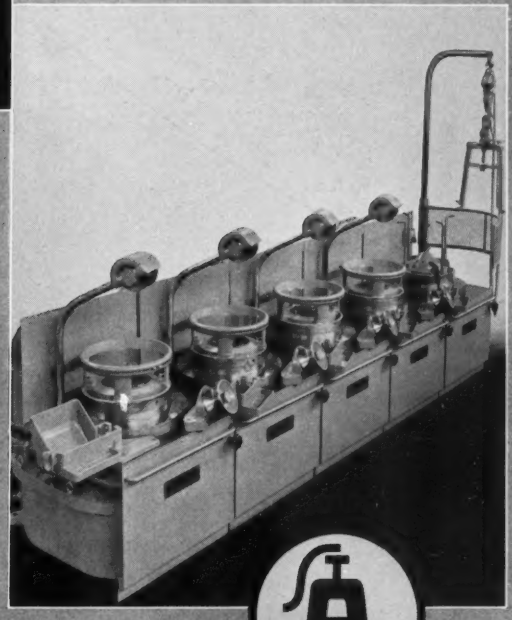

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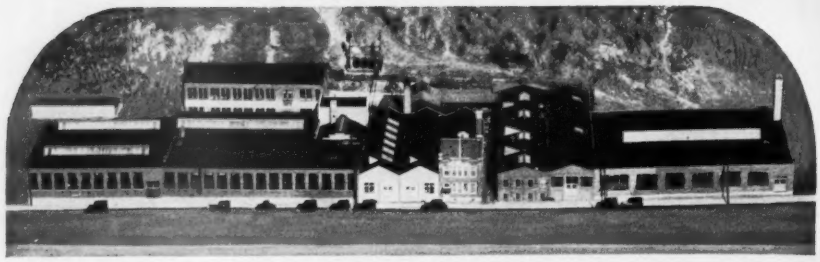

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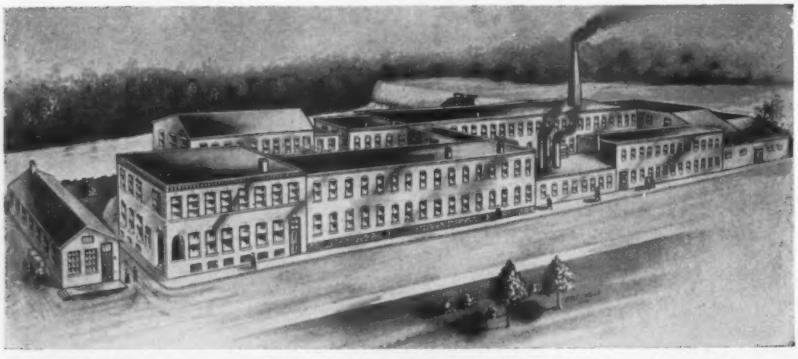

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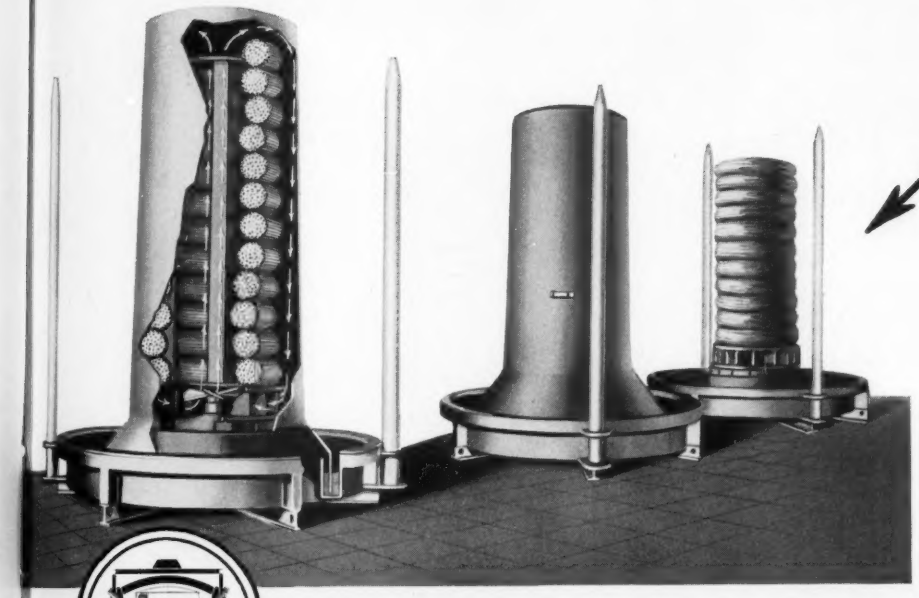

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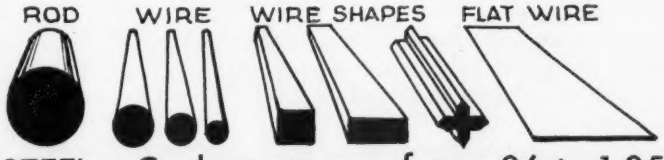

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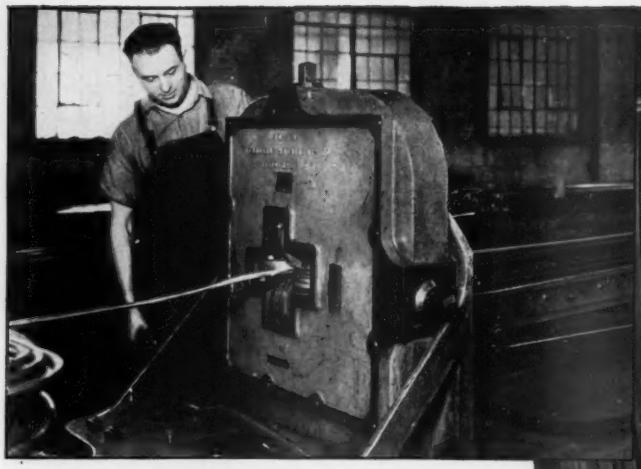

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A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 14 MAY, 1939 No. 5

Designated as

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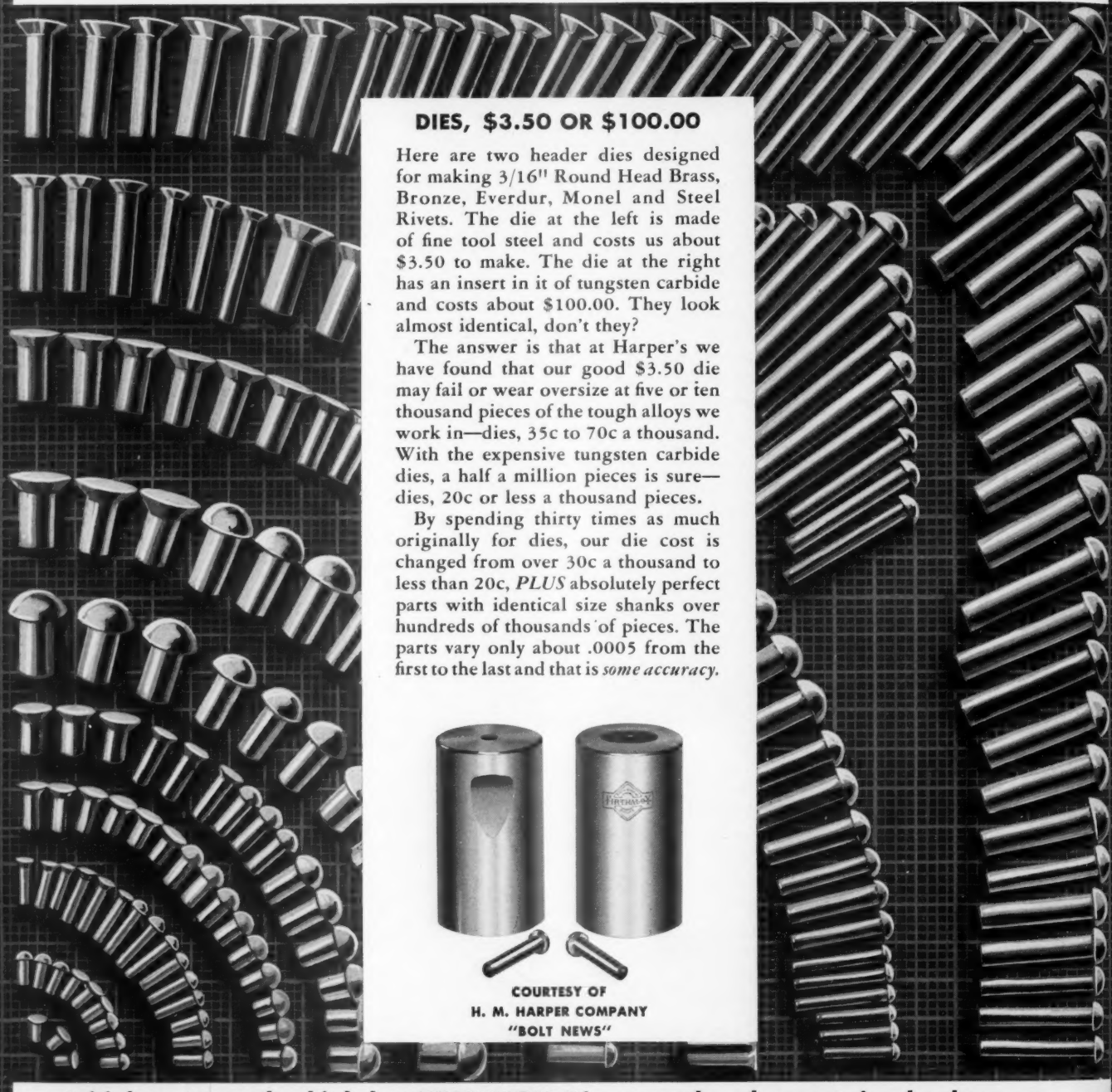

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DRAWING --- ROLLING--- EXTRUDING --- FORMING --- FABRICATING

Vol. 14 MAY, 1939 No. 5

Theoretical Considerations Involved In Reactive Wire Drawing

By H. A. Stringfellow,
New York, N. Y.

An article entitled, "Reactive Wire Drawing" by the same author was published in the February, 1939 issue of Wire & Wire Products—Further research by the author together with criticisms by Kenneth B. Lewis, Consulting Engineer, R. S. Simmons, General Metallurgist and John E. Nordstrom, Research Metallurgist of the Keystone Steel & Wire Co., Peoria, Ill., is now presented. Discussion and criticism will be welcomed as this subject is exceedingly interesting and any discussion, far from being academic, may well lead to distinct commercial improvements in the art of drawing wire. ✦ ✦ ✦

THE usual concept of back pull wire drawing is that a wire under tension, being in an incipient state of reduction, if this wire is drawn through a die the amount of work required to effect reduction is decreased. This appears to be fallacious because a wire under simple free tension, as in a tensile testing machine, and a wire under tension, but restrained by being translated through a die, offer two separate and distinct problems.

✦ ✦ ✦

CONSIDER first a wire in a tensile testing machine and plot the ordinary stress-strain curve for any tensile test. Three critical points are encountered as shown in the diagram, Fig. 1.

✦ ✦ ✦

THE point P is the proportional, or true elastic limit which may be defined as the point of resiliance, or the point at which, if the stress be removed, all of the strain will also be removed and the work performed will be returned to the system.

THE point Y is the yield point, or commercial elastic limit (commonly determined by the drop of the beam in mechanical testing machines). This is the point where necking starts. The strain increases with a decrease in stress, because of necking, and a permanent set is produced in the material.

✦ ✦ ✦

THE point S denotes the inception of the breaking load. At the same time this point is located very closely to the value of the effective stress of deformation, which must equal twice the mean shearing value of the material.

✦ ✦ ✦

CONSIDER now a wire under back tension, which is being drawn through a die. The diagram, Fig. 2, illustrates the conditions obtaining.

✦ ✦ ✦

NOW considering H as fixed and R tending to rotate in the direction "a", a stress is produced in the wire which exists from R, through the die to H; H being the reactive point.

✦ ✦ ✦

NOW consider H as tending to rotate in the direction "A". In this case a stress is produced in the wire which exists from H to D; D being the reactive point.

✦ ✦ ✦

CONSIDERING both conditions to exist simultaneously, which is necessary in order to draw wire, the stress between R and D will equal the stress between R and H and the stress between D and H

will equal the stress between R and H plus the die load.

✦ ✦ ✦

D AND H being the two reactive points in the system it follows that any change in the reactive value of D, due to changes in the characteristics of the wire being drawn, will produce an equal change in the reactive value of H and a corresponding proportional change in the value of the stress between R and H.

✦ ✦ ✦

THE stress between R and D while drawing, lies somewhere between P and Y in the diagram, Fig. 1. There is therefore no necking in the wire. There is however, a tendency to contract which reduces the shearing stresses set up by the cone of the die.

✦ ✦ ✦

CONSIDER now the conditions existing in the die during conventional drawing (drawing with no back tension) and in order to do this consider that the stresses are acting on a vertical section through the wire at right angles to the axis of the wire. It is evident that the crystal grains at the surface of the wire will be displaced backward by the compressive effect of the die cone, while those at the axis of the wire are displaced forward, relatively to those at the surface. The only forces acting are the forward pull and the shearing stresses set up by the die cone, together with the friction load acting parallel to the surface of the die cone and tending to further retard the surface crystal grains.

✦ ✦ ✦

IN drawing by conventional methods it is therefore evident that the flow of metal along the surface of the wire is restrained by simple skin friction along the surface of the entrance cone of the die and also by the horizontal component of this force. The center of the wire is restrained only by the internal friction of the grain boundaries and the heavy shearing stresses induced by the die cone operate to overcome this internal restraint.

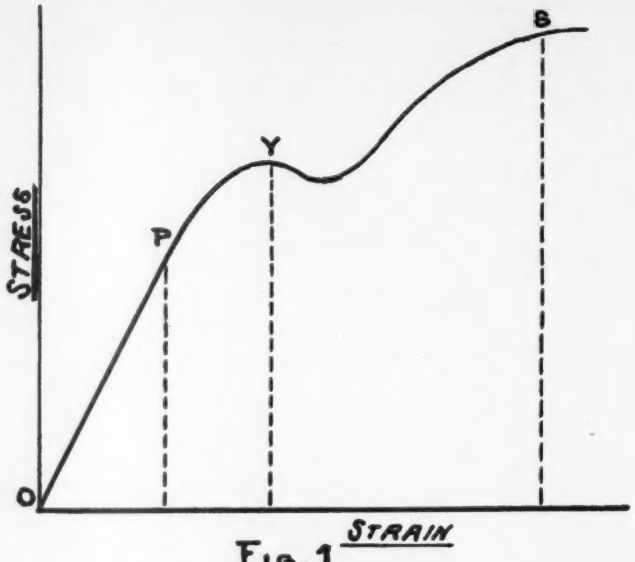
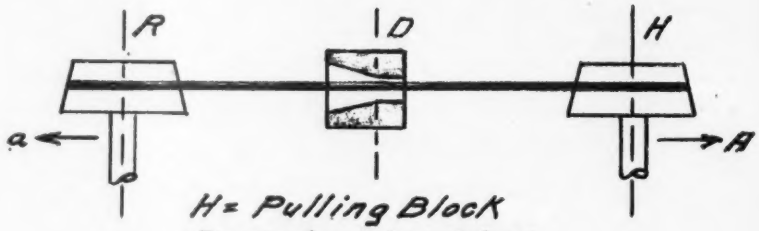


FIG. 1



H = Pulling Block
R = Retarding Block
D = Die
Arrows indicate tendencies of rotation. A must exceed a in order to draw wire.

FIG. 2

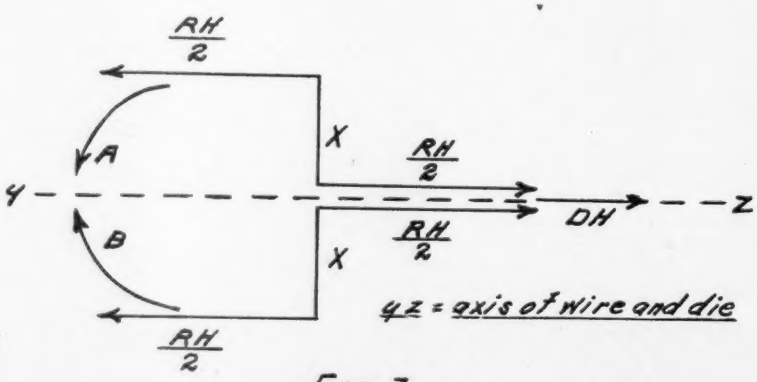


FIG. 3

THESE conditions produce uneven working across the section of the wire, the center of the wire being worked to a greater extent than the surface. As a corollary the surface of the wire is softer than the center and the hardness is not uniform.

✦ ✦ ✦

IN reactive drawing a different set of conditions exist in the die. Refer again to the diagram, Fig. 2.

✦ ✦ ✦

IT is evident that the stress existing in the wire between D and H can be separated into two parts; that existing between R and H and that due to the reaction of D, which is the die load. When these two stresses are separated it is found that the stress between R and H acts in a direction opposite to that of the stress between D and H, because H is the reactive point for the stress R-H while D is the reactive point for the stress D-H.

✦ ✦ ✦

AS action and reaction are equal in amount and opposite in effect, and there is the effect of the die cone to consider, these forces can be resolved, in any longitudinal plane of the wire, in accordance with the following diagram, Fig. 3.

✦ ✦ ✦

THE result of this resolution of forces is that there is the translating force D-H, which represents the die pressure, and the two couples $\frac{RH}{2}X$, which latter represent the back tension and the head pull reaction to this tension. One couple is positive and one negative, as shown by the arrows A and B and both rotate toward the axis of the wire and die.

✦ ✦ ✦

CONSIDER now only stress intensity. The total pull, either forward or backward, divided by the area in any units, on which this pull acts, is the intensity of stress per unit. Let the unit used be dA (differential area) the smallest unit of area mathematically conceivable, and the resulting intensity of stress will be absolutely uniform and act uniformly on each crystal grain. In the following discussion only stress intensity is to be considered.

✦ ✦ ✦

THE action of the stress D-H is to translate every crystal grain forward in the direction of drawing. This stress also generates, by impingement on the die cone, shearing stresses which act in the wire along planes which make an angle with the vertical equal to one-half the angle of the die cone. This shearing stress however, is not sufficient to reach the effective stress of deformation and, if no other stresses were acting the wire could not be drawn. This shearing stress also represents the total stress acting on the die.

✦ ✦ ✦

CONSIDERING the couples $\frac{RH}{2}X$; each crystal grain as it comes up to the point of impact on the die, and from thence down the surface of the cone, is acted upon by one of these couples. The crystal grain is therefore forced to rotate backward by the moment of the couple away from the die surface and toward the axis of the wire. At the same time it is forced downward by the shearing component of the force D-H and forward by the direct force D-H. Which couple acts upon any particular crystal grain depends upon the location of the crystal grain with reference to the axis of the wire.

✦ ✦ ✦

IN reactive drawing therefore, the following condition exists. The normal and tangential components of the forces acting on and along the surface of the die cone are greatly reduced, thus relieving the heavy shearing stresses which are their normal concomitant; in addition, overturning couples are produced whose direction of rotation is opposite to the direction of travel of the wire through the die and which act on each crystal grain throughout the cross section of the wire, with the exception of those lying at the neutral axis. The couples act to reorient the crystal grains by rotation backward and the resulting orientation in the reduced wire is the result of a combined forward displacement and backward rotation, instead of simple forward displacement at the center and backward displacement at the surface.

✦ ✦ ✦

THE above is entirely theoretical and is advanced simply as a possible explanation of what takes place in the die during reactive drawing, and of the results obtained. It does however, satisfy the following conditions:

1. In reactive drawing the shearing stresses developed due to the die pressure are not sufficient in magnitude to reach the effective stress of deformation.

2. The shearing stresses induced by the back tension act on planes at 45° to the axis of the wire, which are the planes of maximum free shear. In the die cone, these planes must rotate to accommodate the cone angle, as this determines the angle of principal shear in the die. In the same section, maximum shear cannot exist simultaneously on two different planes.

3. Neither shearing stress alone being sufficient to effect reduction, reduction must be effected by a combination of the two stresses, as no other forces are acting.

4. Because maximum shear cannot exist simultaneously on two different planes in the same section, the planes of free shear must rotate and it is therefore reasonable to presume that the crystal grains which form their boundaries must rotate also.

✦ ✦ ✦

PRIOR to publication this paper was submitted to Kenneth B. Lewis, Consulting Engineer for criticism. Mr. Lewis' comments follow:

✦ ✦ ✦

I READ **Mr. Stringfellow's** paper on reactive wire drawing with a good deal of pleasure, part of which was afforded by the argument itself and part by the knowledge that this potentially important subject seems likely to get some of the attention it deserves.

✦ ✦ ✦

IT would be easy to take exception to certain of **Mr. Stringfellow's** assumptions, or possibly only to his way of expressing them. But after all it is a new subject and we are all groping for forms of words to give body to our visions. He has put forward what seems to me a fair working theory

to explain facts which are now pretty well acknowledged, and it deserves to stand until bowled over by one which explains those facts more precisely.

✦ ✦ ✦

IF I read **Mr. Stringfellow** aright, he believes that the gradual reorientation of grains during the processing of wire, whose effect is to translate all grains except those squarely on "dead center" into positions more favorable for movement on the slip planes, is markedly accelerated by the back pull in reactive drawing through a partial rotation of grains under the stress system acting in the die cone. There seems to be no direct evidence in support. In the old days before safety stops, an occasional wire drawer would try to go through a die with the wire. None ever succeeded, and even if one had it is probable that his observations on the rotation of crystals at the moment of plastic flow would lack that calm detachment which science demands.

✦ ✦ ✦

BUT we still have the microscope. Reporting the bare facts of reactive drawing some years ago, I submitted calculations to show that savings might be expected in power, frictional percentage, and die wear, with probabilities of advantages in finish and properties, and submitted that theoretically these various benefits might be taken at will, singly or in any combination. Eventually a technique and apparatus will appear, and exploration start, and a little patient laboratory work will then either kill **Mr. Stringfellow's** theory or translate it into a fact. Until then I wish it a short and busy life.

✦ ✦ ✦

A FURTHER critical analysis was made by R. S. Simmons, General Metallurgist and John E. Nordstrom, Research Metallurgist of the Keystone Steel & Wire Co., who state in this connection:

"WE have read Mr. Stringfellow's paper on Reactive Wire Drawing with much interest and while we cannot entirely agree with him, we feel that its publication will stimulate thought on an increasingly important topic.

✦ ✦ ✦

SPECIFICALLY, we question the opening statement that the usual concept of "Back-pull wire drawing" is fallacious and can find nothing in the paper to disprove it. An attempt to disprove it is made in the first four paragraphs of page two, which we feel is incorrect. In these paragraphs the stresses are accurately described for a **static** system which do not in all cases, correctly describe the stresses obtaining when that system is in motion as during wire drawing. When studied in this way it will be noted that paragraph two is incorrect. To properly develop the true stresses, R will have to be considered fixed and H rotating in the direction A. Obviously a stress will soon build up between R and D which is different and less than the stress between DH. This, then, establishes another reactive point, namely, R, which will materially change the conclusions established in paragraphs 3 and 4. The stress relationship in this system would be simply expressed in the equation: $H = D + R$, where the letters shown express the stress at those reactive points.

✦ ✦ ✦

FROM the above relationship it is obvious that the work done by H is equal to the sum of the work done by D and R. With the value for H remaining constant the work performed by D can be decreased by increasing the work done by R. This indicates one great value of reactive drawing, namely, by increasing back pull the work that has to be done by the die is proportionately decreased, thus increasing its life. Another benefit that derives from this fact is that reduced die pressures reduce friction thus reducing the amount of backward displacement of the outer grains with respect to grains on the neutral axis giving, as the author states, a more uniformly worked wire. In this respect, we were very interested in the mathematical development of composite forces which tend to rotate the crystal grains. While we do not feel that metallographic examination will substantiate the claim of actual rotation of the grains, we do believe that these forces may be present, thus giving a further tendency toward necking in the die, thus further reducing the stresses in the die and tending toward more uniform cold working throughout the entire cross section. Frankly, we are too rusty on mechanics to prove the derivation of his theory but it is evident that a novel theory has been presented that may have merit.

✦ ✦ ✦

IF our interpretation of his theory is correct, the effects of reactive drawing, as compared with regular drawing, can be graphically described as shown in the attached Fig. 1.

✦ ✦ ✦

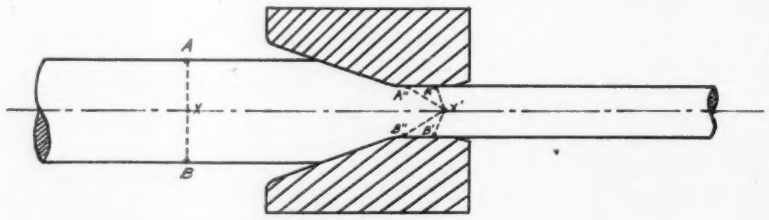


Fig. 1.

THE three points on the wire designated as A x B all lie on the same plane which is perpendicular to the neutral axis. A & B are on the opposite outer fibres and X is on the neutral axis. When drawn through the die the points A & B will be displaced backwards, with respect to the point X. In the case of reactive wire drawing

this lateral displacement will be less than in the case of regular drawing due to a difference in the magnitude and effect of the forces pertaining in the die in each instance. This is shown in the drawing where A′ x′ B′ is the line A x B after drawing by the reactive method and A″ x′ B″ is the line A x B after drawing by the regular method. It is readily apparent that the laterial displacement of A x B in regular drawing more closely approximates (and in some cases will reach) the angle of maximum shear than it will in reactive drawing.

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IN conclusion, we would like to suggest that another benefit of reactive drawing would also be

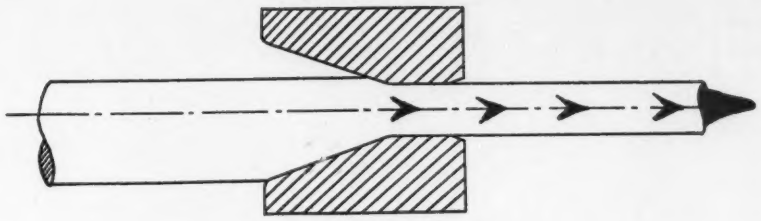

Fig. 2.

illustrated in the enclosed drawings. Under ideal drawing conditions the wire is reduced in the die as shown in figure 1. Here, as you will note, the wire is perfectly centered both coming into and leaving the die. Practical experiences, however, show that too frequently the condition shown in figure 2 obtains in regular wire drawing. Here, undoubtedly, further shear stresses are introduced due to the displacement of the neutral axis and these additional stresses frequently are sufficient to cause "cupping" of the wire. This is particularly true if the entrance angle of the die is large, the draft heavy, and the drawing speeds high. In the case of reactive drawing the wire going into the die would be more perfectly centered and shear stresses lighter thus doing away with this common cause of wire drawing failures.

Pointers for Fencing Salesmen

By H. H. Slawson,
Chicago, Ill.

INDIANA farmers have an average investment of $415 in fences on their property, according to a survey made by Purdue University's agricultural extension service. Per acre investment is $3.84 and the total investment represents approximately 8 per cent of the value of the state's farm real estate.

✦ ✦ ✦

A SIGNIFICANT bit of sales talk embodied in the report advises farmers to avoid cheap fencing.

✦ ✦ ✦

"A FARM fence should combine the two qualities of service and economy," says the bulletin. "The fence that is erected at a low initial cost is not necessarily economical, for it may be short-lived, which makes it an expensive fence in the long run."

✦ ✦ ✦

A DETAILED study of fences on 48 central Indiana farms showed that 90.7% of the total number of rods was of woven wire. After that the favorite fence material was the old-fashioned wooden rail, such as Abe Lincoln was famous for manufacturing. On the 48 farms 4.8% of the total was of rails. Barbed wire came next with 2.3%. Then came poultry wire, 1.1%; board or plank, 0.7%; hedges, 0.35%; and stone, 0.06%.

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THE popularity of woven wire fence, it is pointed out, is due to the fact that in central Indiana hog production is the major livestock enterprise. In areas where more cattle are raised more barbed wire fencing will be found.

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"THE corn belt section of the United States," says the bulletin further, "is probably one of the few areas in the world where a large proportion of the crop fields are fenced. This is because of the large amount of livestock on corn belt farms, the necessity for using an adapted crop rotation to maintain soil fertility, the high value of crop residues and the necessity for rotating pastures in order to increase carrying capacity and to provide clean pastures for hogs."

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DISCUSSING the influence of size of farm on amount of fence per acre, the study reveals that approximately 48% more fence per acre is required on small farms (less than 97 acres) than on large farms (more than 248 acres).

✦ ✦ ✦

CONTINUING, the bulletin says "The number, shape and average size of fenced fields influences the amount of 'owned' fence (other than boundary fences) required per acre to enclose these fields and provide for necessary lanes. . . . The most practical num-

(*Please turn to Page 284*)

The Production of Molybdenum And Tungsten Wire

By W. D. Relyea,
Public Service Electric and Gas Company,
Newark, N. J.

Sirian Wire and Contact Company, a New Jersey company, finds gas the perfect fuel for performing the exacting heat processing required both in the preliminary manufacture of pure metallic molybdenum and tungsten ingots as well as in the ultimate reworking into wire forms for incandescent lamps, radio tubes, and other equipment. ✦ ✦ ✦ ✦ ✦ ✦

A 98-CENT dictionary will tell you that molybdenum and tungsten are "rare metallic elements." This leaves the dictionary in the position of summing up the average person's knowledge of these two most important materials. The production of absolutely pure metallic molybdenum and tungsten and the working of these two metals into required commercial forms has been carried on by a New Jersey firm for a great number of years. This firm is the Sirian Wire and Contact Company, internationally known for its work with these two rare metals.

✦ ✦ ✦

THE methods pursued in the refining and working of the materials in question are interesting, not only because of the insight they give into the metallurgy of the metals themselves, but also because of the many interesting forms of heat treatment employed in the plant to be described. It might be well to know that the particular uses of the finished products demand that the two metals produced be of unusual purity and uniformity. Sirian's production consists largely of exceptionally high grade molybdenum and tungsten wire.

✦ ✦ ✦

LET us first consider the means employed in obtaining the required pure molybdenum ingots. The raw material arriving from Denver, Colo., is ammonium molybdate, a white powder capable of passing through a 40- or 50-mesh screen. Charges of this powder are placed in the retort of the rotary heating machine shown in Figure 1. A roasting process is carried on in this gas-fired unit at a temperature of 800 deg. F. The ammonia and water of crystallization in the ammonium molybdate are driven off changing our white powder to a powder varying in shades of color from gray to a brownish purple. This new powder is molybdenum oxide. The oxide is thoroughly sifted and placed in the small "boats" which carry the oxide into the gas-fired reduction furnace shown in Figure 2. The reduction process is a decidedly "fussy" one. Briefly the problems are: (1) the proper amount of time for the charge to remain in each of three distinct and accurately controlled temperature zones varying in intensity from 1000 to 1800 deg. F., and (2) the accurate control of the flow of absolutely pure and dry hydrogen through the heated muffle. The furnace illustrated was installed several years ago and is performing daily in a most satisfactory manner. The completion of the reduction process brings us pure molybdenum in a gray powdered form. The powder is bolted through a 200-mesh silk bolting cloth and

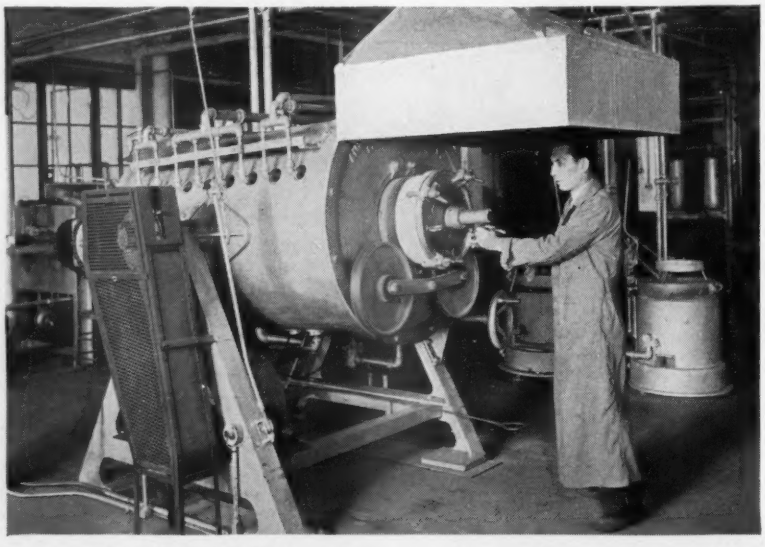

Figure 1. Rotary Heating Machine ✦ ✦ ✦ ✦ ✦

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then pressed into ingots 16 in. long, with a ⅝-in. square cross section. Pressures of 125 tons per square inch are necessary in order to get the proper ingot density. The ingot is then clipped in place in a hydrogen filled "treating bottle." Current passing through the ingot develops a sintering temperature approaching 2500 deg. C. This operation completed, we have a pure molybdenum ingot.

✦ ✦ ✦

THE tungsten production process begins with importation of tungsten ore from China. The ore is converted into various tungsten compounds in the Sirian chemical department shown in Figure 3. It is dissolved, filtered, and precipitated with accurate control of particle size by means of sized jets. The material is washed a great number of times to rid it of its soluble impurities. The distilled water necessary for this work is provided by a still heated with steam from the automatic gas-fired boiler, which is clearly shown in Figure 4. The material is partially dried after which "beneficial impurities" are added; these impurities aid in the control of the grain structure of the finished material. Final drying is accomplished in an indirectly fired, temperature controlled gas oven. Bolting the material through a 200-mesh silk screen prepares it for the reduction furnace described in the molybdenum production process. The reduction serves to drive off the hydrogen and oxygen leaving a tungsten powder mixed with certain impurities. The powder is compressed, giving a very fragile block. Baking this block for 15 minutes at 1100 deg. C. strengthens it so that it can be handled and clamped in the electrodes of the treating bottles. The temperature developed here approaches the melting point of the material and serves among other things to drive off the remaining impurities. The resulting ingot is gray metallic tungsten in its purest form.

✦ ✦ ✦

CHANGES in atmospheric conditions in the treating bottle room were found to be quite troublesome at this stage of the production of the ingots. The solution of the problem was found in the installation of a Silica Gel dehumidifying unit. This unit has proved of inestimable value in maintaining room humidity at a low and constant value. Air drawn from outside the building passes over beds of Silica Gel which effectively remove the moisture present in this air. This dried air then passes through the air cooler, shown near the top of the photograph, and is then distributed to the room. Some recirculation is employed. The moisture-soaked Silica Gel beds are reactivated by the heat from a small gas burner. The basically intermittent nature of the dehumidifying process described is allowed for by incorporating two sets of gel beds in the unit: one set removing moisture from the air, while the other beds are being reactivated. Changeover from one set of beds to the other set is accomplished by an entirely automatic process.

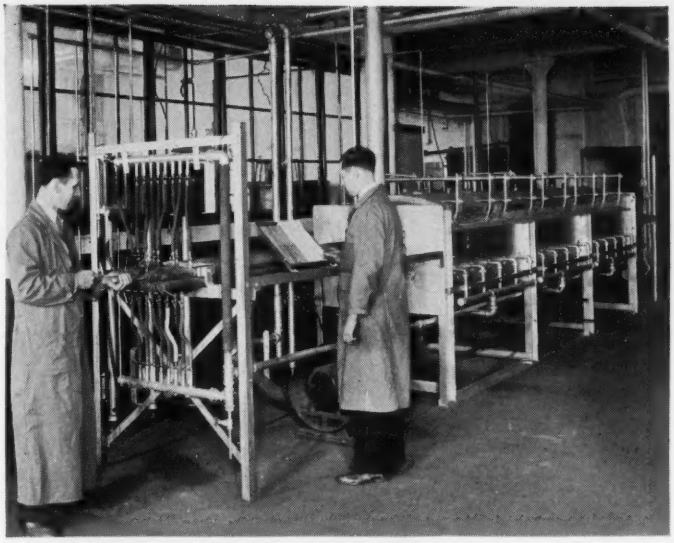

Figure 2. Gas Fired Reduction Furnace ✦ ✦ ✦ ✦

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THE Sirian processes described have served to supply us with pure molybdenum and tungsten ingots. The working of these ingots into the required wire forms

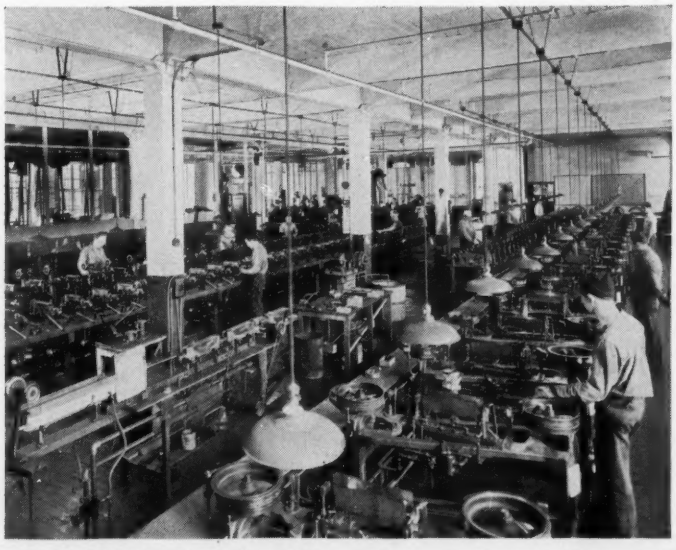

Figure 3. Wire Drawing Equipment. ✦ ✦ ✦ ✦

is quite similar for the two metals, so the following descriptions of the steps taken are combined to some extent.

✦ ✦ ✦

HAND-OPERATED swaging furnaces developing temperatures of 1500 deg. C. reduce the ingots to rod form (tungsten—0.068 in. diameter, molybdenum—0.100 in. diameter). The rods are drawn through a series of diamond dies to reduce them to the required commercial wire sizes. A simple enough series of operations when described in these few words, but in practice the simplicity is purely mythical. ✦ ✦ ✦

EXPENSIVE dies, materials that tend to work harden far too rapidly, excessive strains set up in the wire, the problem of die lubricants—all these, plus other factors tend to complicate the wire-drawing process. Years of patient and painstaking development work have been spent in reducing the operations to the present state of perfection. Drawing at accurately determined temperatures reduces die wear and serves to remove the wire strains. A specially prepared colloidal graphite lubricant aids die life and serves to a certain extent in providing "wire atmosphere" as the wire passes through the heating zones. These heating zones are provided by specially built pipe burners equipped with carefully designed venturi air mixers. Required temperature and atmosphere control is obtained by manipulation of a single gas valve on each burner. Naturally the speed and tension of the wire in passing through the heating zones and dies are of great importance. These factors are kept constant by carefully designed sets of feed and take-off rolls. The equipment for the early wire draws is shown in Figure 3, the equipment for the finer wire draws in Figure 5. These final wire draws produce wire as fine as 0.00035 in. diameter. Still finer wire could be drawn, but is not called for by existing commercial requirements.

✦ ✦ ✦

THE size of the wire produced requires measuring accuracy calling for methods more elaborate than the use of micrometer calipers. Weighing methods supply the answer to this problem. The measuring stick used is the weight in milligrams of a 200-millimeter length of wire. Thus the 0.00035

(*Please turn to Page 283*)

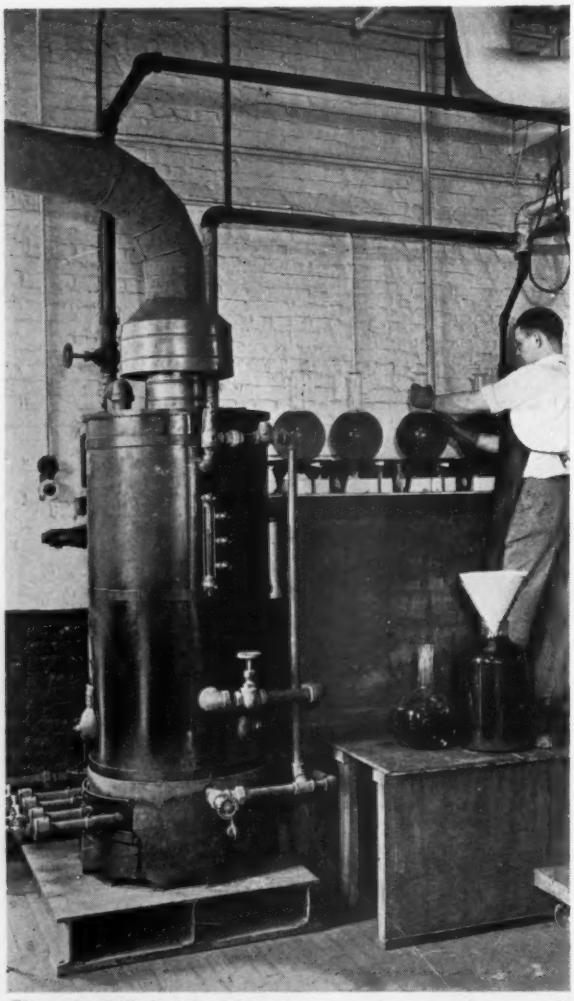

Figure 4. Still, heated with steam ✦ ✦ ✦

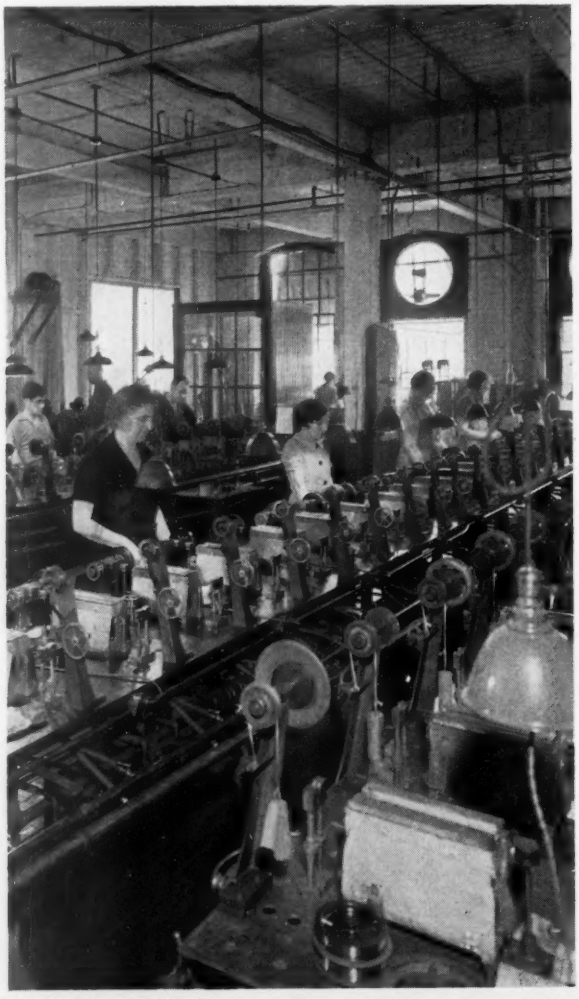

Figure 5. Fine wire drawing ✦ ✦ ✦ ✦

The Business of National Defense

Address by the Honorable Louis Johnson, Acting Secretary of War at the National Industrial Preparedness Dinner. American Conference of National Defense Waldorf-Astoria Hotel, New York City. ✦ ✦ ✦

FRIENDS of National Defense: This gathering is a striking testimonial to the solid front of mutual understanding that is held today by all loyal Americans in their common cause of national defense. It is a clear manifestation that when the safety of our country is at stake, we meet neither as Democrats nor as Republicans, neither as conservatives nor as liberals. We are cast simply in the role of patriotic Americans who have come together to discuss the welfare and the security of our homes and our ideals and to learn the part that we must play in their defense.

✦ ✦ ✦

ALL around us, at every table, there is evidence of a spirit of unity. May I point out a typical example? Our toastmaster, who so graciously introduced me a few moments ago, is **Colonel Frederick H. Payne.** He served the cause of national defense under a Republican President. Today, I hold his old portfolio under a Democratic Administration and am equally zealous for the welfare of our country. When it comes to national defense, **Colonel Payne** and I are agreed on all fundamentals. Our presence together on this platform is a symbol of a united America that places national defense above party.

✦ ✦ ✦

IT is the genius of America that we, in this country, have the privilege to differ in opinions, in beliefs and in theories. We may worship God as Catholics, Jews or Protestants. Only in our devotion to liberty, in our faith in freedom and in our determination to keep all forms of aggression from invading our shores and from interfering with our American way of life, do we live as one and act as one.

✦ ✦ ✦

IN the relations between the Army, the Navy and Industry, that unity is conspicuous at every turn. Every day since June 28, 1937, when I assumed my duties in the War Department, there have come to my attention many examples of the patriotism of American business that transcend considerations of gain and profit. Time and again, especially in the last few months, we, in the War Department, have found it necessary to call upon industry for help and on no occasion, to my knowledge, has industry failed us.

✦ ✦ ✦

LET me tell you how industry came to our aid in the procurement of a reserve supply of raw materials. As you know, a successful industrial mobilization program requires not only manufacturing facilities but also a ready supply of raw materials. For most of our munitions, we, in America, are self-sufficient and entirely independent of world conditions. We have ample resources of food, of machines, of chemicals and of most of the minerals. No nation in the world can match our list of materials that are necessary in the manufacture of munitions. For a few indispensable items, however, we are forced to depend almost entirely on foreign sources.

✦ ✦ ✦

WE depend on foreign sources for 99 per cent of our chromium, 95 per cent of our high grade manganese, 50 per cent of our tungsten, 95 per cent of our rubber and practically all of our tin.

✦ ✦ ✦

FOR years, the War Department faithfully has pointed out shortages in these items and in others, such as antimony, nickel, quinine and mica. Time and again, we have urged the accumulation of a reserve of these strategic materials for an emergency. We realized that a war in Europe or in Asia may make it difficult for us to get these materials at a time when we might need them most. We recognized that without such a reserve, our whole industrial mobilization project might become jeopardized; but the likelihood of an emergency appeared too far off. Congress took no steps to acquire these items in the necessary quantities.

✦ ✦ ✦

THEN came the conference at Munich. War in Europe seemed only a matter of hours. No one could foretell the full implications of such an impending struggle, but it was clear to anyone familiar with the history of the world that the role of the neutral would depend principally on his ability to demand the respect of all belligerents. It became obvious that we would have to strengthen our Army and to build up our Navy. We took stock. Shortages in strategic and critical raw materials stood out conspicuously. We realized that unless we made up these delinquencies at once, we would have trouble in getting what we wanted when our production program would get under way; but Congress was not in session. The War Department had no funds

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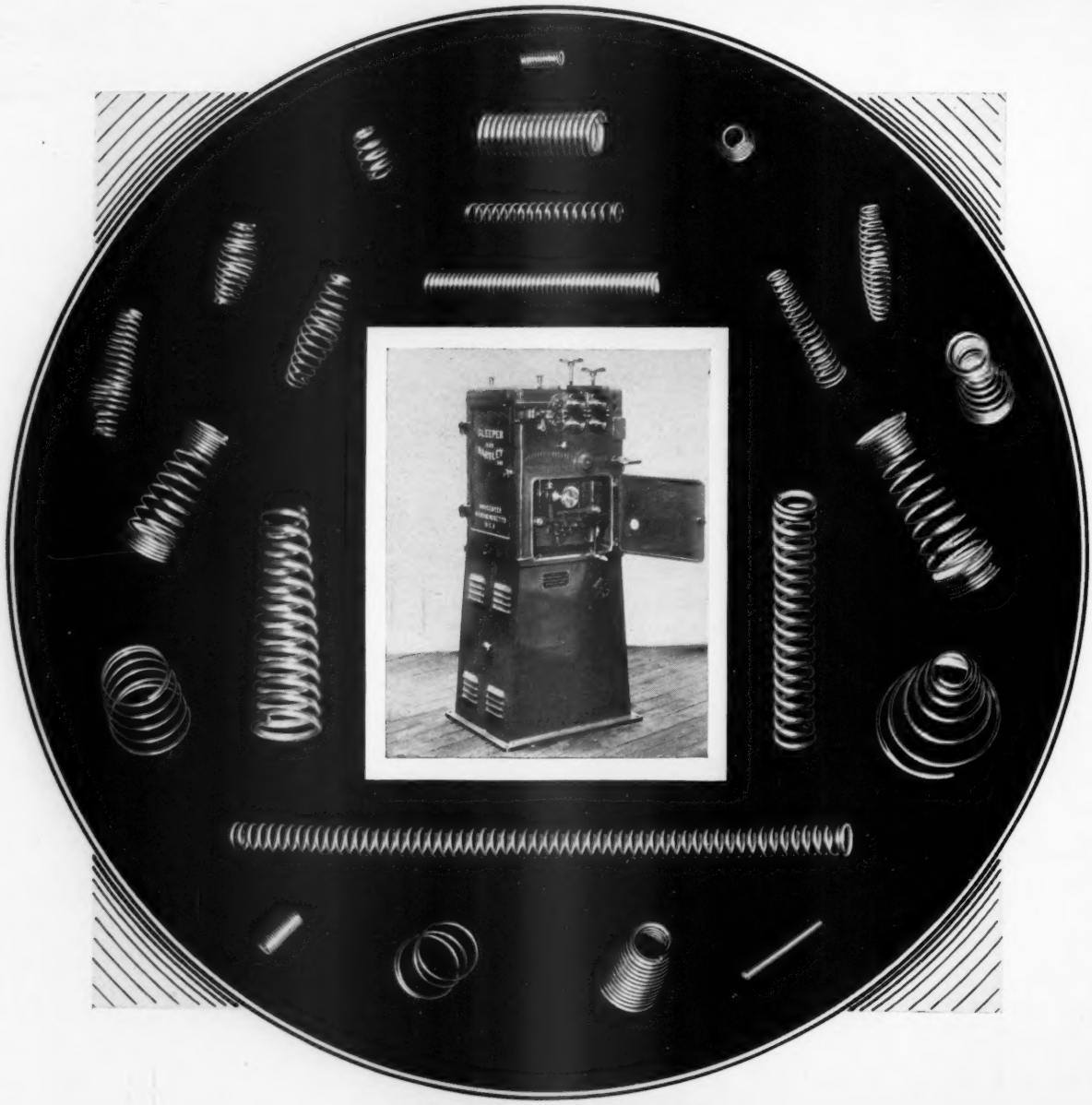

ASK FOR BULLETIN No. 666

SLEEPER & HARTLEY, Incorporated

Designers and Builders

WORCESTER, MASSACHUSETTS, U. S. A.

with which to buy strategic materials. We turned to industry.

✦ ✦ ✦

WE called a conference of those who used chromium and explained the situation. Immediately, they responded. One corporation, to my knowledge, went out into the open market and bought enough chromium to tide over its needs for a period of three years.

✦ ✦ ✦

WE told a group of industrialists of the likely shortage of manganese and the greatest American producers of ferro-manganese began to build up their stocks of reserves.

✦ ✦ ✦

WHEN we informed industry of our needs in tungsten, it intensified the development and the production of this mineral in our own country and added considerably to our annual output.

✦ ✦ ✦

WHEN we pointed out our needs in rubber, industry intensified its efforts, at great expense, toward the production of a substitute. I am sure you will all be interested to learn that there is every indication of success in this significant experiment.

✦ ✦ ✦

WHEN we advised industry of our requirements in tin, it lent its energy toward the development of a nickel plated can which today gives every promise of replacing tin for all purposes and at no greater cost.

✦ ✦ ✦

THERE are other examples of industrial cooperation with the War Department in the field of raw materials, as well as in other fields, that I might mention, but I trust that the instances I have given you will suffice to indicate the general trend in the relations between government and business. I am happy to commend publicly those industrial leaders who, at a temporary expense to their stockholders, put into storage, quantities of raw materials, far beyond their normal needs, merely because their government suggested that they do so.

WHILE on the subject of raw materials, I am happy to remind all friends of national defense that the Committees on Military Affairs of both Houses have recommended the enactment of legislation for the purchase of War Reserve stocks of strategic critical materials essential to national defense. This project has the support of the military services.

✦ ✦ ✦

THAT same spirit of cooperation that was manifested in the procurement of strategic materials was duplicated when we turned to the power industry for help. The National Defense Power Committee, of which I am chairman, found it necessary to begin its work with an industrial power survey. We asked the utilities to supply us with information in regard to their present capacity. We called upon them to estimate their future load growth. We requested their plans for capacity installations. Every utility we addressed sent a committee from its executive and engineering staffs to Washington, at its own expense, to analyze the nature and the breakdown of the information desired. Within thirty days, the power industry met the desires of the War Department and the Federal Power Commission. We simply had told industry what we wanted; and, characteristically, industry responded.

✦ ✦ ✦

LAST September I called a conference of utility executives in munitions centers and discussed with them the power situation. I pointed out to them shortages in capacity and asked them to start at once on the construction of at least a million kilowatts of additional capacity. Their answer was prompt and wholehearted. Today, a capacity of approximately 900,000 kilowatts is ready for immediate installation or on order and there is every indication that we very soon will reach our million mark.

✦ ✦ ✦

AS part of our power project, we asked the utilities and the manufacturers of turbo-electric equipment to standardize engineering machinery of each capacity. Again, industry fully cooperated. As a result, a document entitled, **"Preferred Standards for Steam Turbine Generators of 10,000 Kilowatt Rating and Above,"** has been prepared and published and it has met with the enthusiastic commendation of the entire electric industry.

✦ ✦ ✦

OUR power program required that we confer with experts on rates and that we have access to company records. The National Defense Power Committee sent out field parties. Wherever they went, they were cordially received. They were given free access to the necessary records. They were provided with stenographic and clerical help. They were offered engineering advice. The narrow bottleneck in power supply is slowly cracking and it is due to the wholehearted cooperation of the industry that we have made such excellent progress.

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WHILE acknowledging the debt of the War Department to industry, I would be remiss in my duty if I made no mention of the technical societies, the trade associations and the committees without whose help we could have made little or no progress in national defense plans. To name but a few, there is the National Machine Tool Builders Association, the Hydraulic Machinery Manufacturers Association, the American Society of Mechanical Engineers, the Society of Automotive Engineers, the American Chemical Society, the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, the Army Ordnance Association, the Quartermasters Association, the Wire Association, the National Association of Manufacturers and dozens and dozens of others. The last and not the least of these is our host of tonight, the American Conference on National Defense, which is lending its efforts toward the consolidation of all of these patriotic agencies in their common goal of an adequate national defense.

TIME and again in the past few months, I have had occasion to discuss with the President of the United States the contributions of American industry to our national defense program. When I told him of my plan to acknowledge these contributions tonight, he enthusiastically applauded. **"That's fine,"** he said.

"Add these words for me. In the revival of the spirit of national defense, industry is playing a leading and vital role. I am conscious of its loyalty. I appreciate its cooperative efforts. Its patriotic services I commend as an example of good and useful citizenship."

To these forceful words of my Commander-in-Chief, I can add nothing.

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BECAUSE I have emphasized what has been done in the past, I trust no one will get the impression that there is nothing left to be done, now and in the future. On the contrary, there is a great deal of work ahead and we must look to industry for continued support and leadership.

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LET me briefly suggest a few of the things that industry can do to help national defense:

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FIRST, get behind and stay behind the President's armament program until every phase of it is enacted into law. It is farsighted, patriotic and non-partisan. It merits your wholehearted support. It demands a Navy second to none. It calls for an Army, small in size, compact in organization, fully equipped with the best of modern arms and capable of expansion to meet any emergency.

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SECOND, keep an open mind on our defensive needs. National defense can not be measured in absolute terms. We confidentially believe and fervently hope that the enactment of the President's armament program will go a long way toward strengthening America and toward minimizing dangers of attack against us. We must realize, however, that we alone do not have the privilege of the last word on the subject of preparedness. We must keep pace with world conditions. What was adequate yesterday, we know is no longer today. What may be enough to protect us when the President's program is realized, at some future day may prove wholly insufficient.

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THIRD, educate yourselves in the production of necessary war munitions. Many of you are among the 10,000 responsible civilian plants with a record for efficiency, honesty and cooperation that the Army has selected to make munitions in time of war.

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OF the 10,000 plants allocated for munitions purposes in this country, more than 4,000 of them are located in the area that extends from Boston to Wilmington and west to Pittsburgh. Pennsylvania has 1,431 allocated plants. New York has 1,101. Massachusetts has 711. New Jersey has 42. Connecticut has 349. Rhode Island has 148, and Delaware has 29. This small territorial belt that I have designated is the lifeline of America. More than 60 per cent of our war needs for munitions will have to be manufactured in this congested area.

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WE trust that the War Department will be able to come to the assistance of those of you who are on the program to manufacture critical items for which there are no ordinary peace-time demands. At the suggestion of the President, both Houses of the Congress have authorized the appropriation of forty-two and a half million dollars for educational orders toward the preparation of industry for war-time tasks. When supported by appropriations, this measure will provide the War Department with the necessary means, over a period of years, to help educate those plants which have been allocated work on strictly non-commercial items.

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FINALLY, give every assistance to the War Department procurement officers who visit your plants. They are men of extensive military experience, who are specializing in industrial mobilization. They have a record of achievement which merits your approval and respect. They do not pose as industrialists. They do not come to tell you how to run your factories. They have no designs to take over your business. Industry will be expected and can be trusted to run its own affairs. Their mission is merely to help familiarize you with the needs of the services and to keep you posted on the latest developments.

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THE job of the Procurement District officers is continuous. They are ever on the lookout for new and improved facilities to meet the growing demands of a modern Army and Navy. These officers may have visited you already or perhaps they have not gotten around to you yet. Whenever they come, give them a sympathetic hearing. You need have no misgivings about discussing any of your problems with them. If you give them information in confidence, they will respect your wishes. They have never violated their trust in the past. They will continue in their loyalty to the traditions and the honor of their profession. They will conduct their business with you as officers and gentlemen.

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I TRUST that these few points may suffice to indicate the general trend that I sincerely hope government and business will follow in their mutual relations in all matters pertaining to national defense.

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QUITE naturally, I have emphasized tonight the cooperation between business and the Army. May I add that every element of our American life is equally eager to help with our national defense program. In this present state of world affairs, America realizes that our strength lies wholly in cooperation. In other countries, compulsion may be the keynote. With us, cooperation, it still remains.

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We are the fortunate heirs of a great democratic tradition which has served

(*Please turn to Page 280*)

The

ANNUAL MEDAL AWARDS

OF THE

WIRE ASSOCIATION

For the Most Meritorious Paper on
Wire Manufacture or Fabrication During the Year

ALL members of the Wire Association are cordially invited to submit technical papers either for publication in "WIRE & WIRE PRODUCTS" during the year or for presentation before the Annual Wire Association Meeting at Chicago, October 23-27, 1939.

+ + +

FOR 1939 and subsequent years a medal will be awarded in each of the two major divisions of the activities of the Association, to the papers coming nearest to the requirement set forth above.

+ + +

CONSIDERATION for the Medal Awards is not limited to the papers presented at the Annual Meeting, but is given to all papers submitted by members and published in "WIRE & WIRE PRODUCTS" during the year.

+ + +

SELECTION of papers to be presented at the Annual Convention rests in the hands of the Joint Programme Committee of the Wire Association.

+ + +

ALL papers submitted become the property of the Wire Association, and the Board of Directors constitutes the Committee on Awards.

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ADDITIONAL information may be obtained by addressing:

RICHARD E. BROWN,
SECRETARY, THE WIRE ASSOCIATION

Stamford Trust Co. Bldg., STAMFORD, CONNECTICUT

Wire Association Regional Meetings At New York and Worcester

DURING the month of April The Wire Association held two regional meetings, one on April 5th as a part of the National Industrial Preparedness Program of the affiliated engineering societies of the United States, and one at Worcester, Massachusetts on April 25th.

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The New York Meeting

ON April 5th in connection with the National Industrial Preparedness dinner about thirty members of the Wire Association from different sections of the country, attended a plant inspection of the New York Signal Corps Procurement District at the Army Base in Brooklyn. Following this visit there was an informal group meeting at the Wire Association headquarters in the Waldorf-Astoria Hotel, New York, and in the evening all attended the National Industrial Preparedness Dinner of the American Conference on National Defense.

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THIS dinner was the most impressive ever held in New York and over 1500 leaders of American Industry were present. The keynote address was by the Honorable Louis Johnson, Acting Secretary of War on the subject of "The Business of National Defense." This address will be found on page 261 of this issue of "WIRE & WIRE PRODUCTS."

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THE local New York committee in charge of arrangements for that meeting were: Sidney Rolle, Assistant Manager, Scomet Engineering Company, L. D. Granger, Assistant to Vice-President, Wickwire Spencer Steel Company, and Major Richard E. Brown, Secretary of the Wire Association.

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The Worcester Meeting

PRECEDING the meeting and plant inspection, the program was started with an informal luncheon of the officers and committee, tendered through the courtesy of the **Wickwire Spencer Steel Company.**

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THE Worcester regional meeting consisted of a plant inspection at the Norton Company of Worcester, Mass. with 55 in attendance. This was followed by an informal dinner with 75 in attendance, and then by a technical meeting at which over 125 were present.

RODMAN R. TATNALL

Chairman, Worcester Regional Meeting Committee. Born in New Rochelle, N. Y., in 1906. Educated at Worcester Polytechnic Institute. First employment one year in Development Dept. of Waltham Watch Co. In 1928, joined Wickwire Spencer Steel Co. in spring production dept. In 1930, was promoted to position of Metallurgical Engineer, and since then has been in charge of experiment and research on spring and spring materials. Member of Wire Association and American Society for Metals.

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THE assisting members and guests were greeted by **Mayor William A. Bennett** of Worcester, who extended the hospitality of the city to them, and following the dinner addresses were made by **Mr. Frederick A. Westphal,** President of the Wire Association, and **Major Richard E. Brown,** Secretary of the Association.

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MR. WESTPHAL'S address follows:

"Gentlemen:

"Let us hope that the inauguration of this first Worcester Regional meeting of the Wire Association is the start of a continuity for many years to come of a similar function, such as we are witnessing and experiencing today and this evening.

"At our Detroit convention in October, 1938, the conception of this meeting took place, and subsequently your Board of Directors at their Annual meeting in New York on March 10th, 1939, confirmed this present day arrangement.

"May I extend earnest congratulations to Mr. R. R. Tatnall of Wickwire Spencer Steel Company, who is chairman in charge, and also the six committee members for their work and efforts in behalf of this first Worcester Regional meeting of the Wire Association. The committeemen are K. B. Lewis, Consulting Engineer, Eugene Roth of the Carboloy Company, P. A. Beaman of Morgan Construction Company—all these gentlemen are from Worcester; also S. Ekstrom of the New England High Carbon Wire Company, Millbury, Mass., R. V. Olson of the Mossberg Pressed Steel Corporation, Attleboro, Mass., and Earle H. Thomas of the George W. Prentiss Company, Holyoke, Mass.

"May I at this time express thanks to the Norton Company for their hospitality and for the interesting inspection of their plant.

"Speaking personally, Worcester has a warm spot in my heart. On May 1st it will be twenty years since I returned from service in the World War, reported to the late Clinton S. Marshall, District Manager of the New England Mills of the American Steel & Wire Company,

and became re-employed and again started work in this wire industry at South Works in this city.

"As I reflect back it seems only yesterday that this incident took place, and may I take this opportunity to pay tribute to a man who made a deep and lasting impression upon me, and who has donated much to the wire industry.

"These regional meetings are definitely now a part of our annual program of activities combined with our annual convention with the National Metal Congress to be held this year in Chicago October 23-27th. The third annual regional meeting of Pittsburgh takes place next week on May 5th, and we anticipate a meeting fully as successful as the previous two. The first regional meeting of New York City took place on April 5th, at which time the Wire Association coordinated with the national industrial program and listened to the message on industrial mobilization by Col. Louis A. Johnson, Assistant Secretary of War.

"As President of the Wire Association may I conclude by expressing greetings and deep appreciation for the efforts of your local organization and achievement here in Worcester, and let's hope that the years will be kind to us all and that each year we may join together for the benefits of friendly, social and professional contacts, and that this will be an event to look forward to by all of you here in this New England district as something really worth while. I thank you."

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MAJOR BROWN devoted his talk to propaganda on behalf of the Wire Association, explaining briefly the origin and history of the Association to date and outlining the many present activities and the advantages to be gained through membership.

FOR the technical side of the evening two speakers presented papers. **Mr. M. F. Beecher** of the **Norton Company** spoke on the relation of research in abrasives and the use and application of these abrasives in industry. His talk was short, but very well presented. Considerable discussion was evoked on the nature and properties of boron carbide. Its use in grinding wheels was found to be impractical due to its peculiar properties. However, fields have been found for it, particularly guages, some wearing parts, sand blast nozzles, and the like.

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ASSISTANT Professor **Carl G. Johnson** of **Worcester Polytechnic Institute** presented the principal paper of the day. His subject was "Wire Mill Trouble Shooting with the Aid of the Microscope". The paper in full will be published in the June issue of Wire & Wire Products. In Professor Johnson's inimitable style, a large number of very excellent micrographs were shown and explained, showing how such things as decarburization, surface defects, underheating or overheating and many others, can be traced with the help of the microscope. The discussion started by this paper ranged from the use of X-rays in studying wire to the famous Mt. Hope bridge failure. The latter proved to be a tender subject since it seems that none of the many theories advanced fully explain the failure of the wire used on this bridge.

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THE meeting was in charge of the following committee:

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R. R. Tatnall, Metallurgist, Wickwire Spencer Steel Co., Worcester, Mass., chairman.

Kenneth B. Lewis, Consulting Engineer, Worcester, Mass.

R. V. Olson, President, Mossberg Pressed Steel Corp., Attleboro, Mass.

P. A. Beaman, Sales Manager, Wire Machinery Div., Morgan Construction Co., Worcester, Mass.

S. Ekstrom, Works Manager, N. E. High Carbon Wire Co., Millbury, Mass.

Eugene Roth, Manager, The Carboloy Co., Inc., Worcester, Mass.

Earle H. Thomas, Superintendent, George W. Prentiss Co., Holyoke, Mass.

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THIS was the first Worcester regional meeting held by the Association and in view of the attendance at the technical session, it is felt that the meeting was highly successful and it seems probable that it will now become one of the regular annual regional meetings of the Wire Association. At the conclusion of the meeting a vote of thanks was extended to the committee in charge.

THE PAPERS PRESENTED AT THE
PITTSBURGH AND WORCESTER REGIONAL MEETINGS
OF THE WIRE ASSOCIATION
WILL BE PUBLISHED IN THE JUNE NUMBER
OF WIRE AND WIRE PRODUCTS

— THE PAPERS —

"METALLOGRAPHY IN THE WIRE INDUSTRY"
By Prof. Carl G. Johnson

"PROBLEMS IN WIRE DRAWING"
By G. A. Caldwell

"PROBLEMS PERTAINING TO THE HEAT TREATMENT OF WIRE"
By Dr. A. A. Bates

"RECENT DIE DEVELOPMENTS"
By Dr. Edgar Engle

THE WESTINGHOUSE PLANT INSPECTION AT EAST PITTSBURGH
INSPECTION OF THE NORTON COMPANY PLANT AT WORCESTER

Outstanding Personalities of the Wire Industry

Walter H. Kurtz

SHEFFIELD Steel Corporation Engineer receives the Palms of an officer of the French Academy.

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ONE of the highest honors a man of science, arts or literature can receive from the French government is the Palms d'Officier d'Academie.

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WALTER H. KURTZ, general superintendent of maintenance of the Sheffield Steel Corporation, was recently presented with this distinguished honor and with the medals shown above by Dr. Hans Schaerrer, Consular Agent of Switzerland and Dr. Wm. Schaerrer, French Counsel of Kansas City. The honorary degree was dated November first, 1938 in Paris, France.

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THE membership in the French Academy is limited. Candidates are first elected and then approved by the Minister of National Education of France and by the Chief of the Bureau of the Cabinet. The qualify; a candidate must have done some noteworthy, original, and responsible work in France, must be a graduate of a University of high order and have a master or professional degree. He must also be the author of articles, papers or books which are considered an important contribution to his profession.

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MR. KURTZ served in the World War as a special technical engineer under General W. W. Atterbury, the late president of the Pennsylvania Railroad. He served with the General Superintendent of Motive Power, the Engineer of Construction, and with various engineering regiments of the United States Army, and was on detached service with the French and Belgian engineers on locomotive construction and railway facilities.

MR. WALTER H. KURTZ and the Palms of the French Academy he received for distinguished service.

MR. KURTZ is a graduate of the Washington University in St. Louis, Missouri, and received the degree of Bachelor of Science in Mechanical Engineering, June 1917, and the Professional degree, Mechanical Engineer in June, 1923. In addition to being elected an officer of the French Academy Mr. Kurtz has been decorated by various European countries for distinguished service during the World War.

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Whipple Jacobs, President, Belden Manufacturing Company

WHIPPLE JACOBS, former vice-president in charge of sales, was elected President at the annual meeting of the board of directors of Belden Manufacturing Company. In this capacity he succeeds the late Joseph C. Belden, founder of the company, who died February 17.

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MR. JACOBS has served with the company for twenty-four years. He began, shortly after leaving school, as an inspector in the factory. He later was made Chief Inspector, Purchasing Agent, Sales Manager, and Vice-President. His one leave of absence from the company extended for twenty months when he was in France with the A.E.F.

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ALWAYS active in the industries which Belden Manufacturing Company serves, Mr. Jacobs is at present chairman of the Wire and Cable Division of N.E.M.A. He is a member of the Chicago Club, Indian Hill Country Club, the Electric Club of Chicago, and the Electrical Manufacturer's Club.

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W. G. Hume General Manager of Sales, Pittsburgh Steel Co.

THE Pittsburgh Steel Company has announced effective April 1, 1939, the appointment of William G. Hume as general manager of sales. Mr. Hume was formerly manager of sales of the wire and wire products division of the company and succeeds A. E. Walker who resigned recently.

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J. K. Beeson, Assistant Gen'l Mgr. Of Pittsburgh Steel Co.

J. KENNEDY BEESON who was formerly assistant manager of sales has been appointed assistant general manager of sales, and Henry A. Roemer, Jr., who was formerly Pittsburgh district sales manager has been appointed manager of rod and wire products sales.

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Pittsburgh Steel Elects Two New Directors

MILTON HUGHES, operating vice president of the Sharon Steel Corporation, Sharon, Pa., and John U. Anderson, treasurer of the Pittsburgh Steel Company, have both been elected directors of the latter concern, which is headed by Henry A. Roemer as president. Mr. Anderson gained his early experience in the steel industry with the former Trumbull Steel Company, at Warren, Ohio, and was subsequently treasurer of the National Fireproofing Company, Pittsburgh.

Outstanding Personalities of the Wire Industry

Walter F. Munford

Assistant to Vice President (Operations) American Steel & Wire Company Subsidiary United States Steel Corporation

WALTER F. MUNFORD, Assistant to Vice President (Operations) of the American Steel & Wire Company was born in Worcester, Massachusetts on June 8, 1900. He was educated in the Worcester Schools and attended the Worcester Polytechnical Institute where he majored in Mechanical Engineering. Later, he matriculated at Massachusetts Institute of Technology where he majored in the same subject.

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MR. MUNFORD'S first position with the American Steel & Wire Company was during his summer vacation in 1919 when he worked as a die reamer at the Company's North Works in Worcester. After leaving school he became a helper in the Open Hearth Department in the same city. Following this, came two other positions before he was made Superintendent of the Open Hearth in 1927. In 1930 he was transferred to Cleveland where he became Superintendent of the Open Hearth at the Company's Newburgh Works. Three years later, when this division was dismantled, he was transferred to the National Tube Company at Lorain as Assistant Superintendent of the Steel Works. Mr. Munford became Assistant Superintendent at the Wire Company's Cuyahoga Works in Cleveland in 1934 and Superintendent in January, 1937. His appointment as Assistant to Vice President of the Company was made effective April 15, 1939.

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Additions to Metallurgical Staff, American Steel & Wire Company

APPOINTMENT of five new members to the main office metallurgical staff of the American Steel & Wire Company, subsidiary of U. S. Steel Corporation, has

WALTER F. MUNFORD
Asst. to Vice President
American Steel & Wire Company

been announced by J. S. Richards, manager of the metallurgical department of the company.

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THE appointments include L. F. McGlincy, who becomes division metallurgist on heating and hot rolling. He was formerly open hearth and hot mill superintendent for the company at Worcester, Mass.

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R. H. BARNES, formerly district metallurgist in Cleveland becomes division metallurgist on flat rolled products and strip.

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ASSISTANT division metallurgist on high-carbon products is A. F. Ilacqua, formerly standard practice metallurgist at Worcester.

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JOHN F. OCCASIONE becomes assistant division metallurgist on coatings, whereas formerly he was in charge of similar work for the Cleveland district.

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NEW assistant division metallurgist on standard practices is J. E. Millen, who was formerly in charge of statistical work in the company's physical laboratory in the Cleveland district.

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G. A. Connors Elected Vice President of The Pittsburgh Steel Co.

GARRETT A. CONNORS was recently elected vice-president in charge of industrial relations of Pittsburgh Steel Company. Mr. Connors will continue in a similar post with Sharon Steel Corporation. Prior to his election as vice president he had been in charge of industrial relations for that company.

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George Scherr Co., New Catalog

THE George Scherr Company has just published a new general catalog showing the complete line of machine tools, instruments and machinery handled by this organization.

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THE catalog includes mechanics' tools such as vernier calipers, height gages, micrometers and plug gages; optical inspection tools such as toolmakers' shop measuring, binocular, comparison and metallurgical microscopes, comparators and projectors. Also gear testing equipment, gear hobbers, gear grinders, thread and worm millers, relieving lathes, saw sharpeners; machinery for instrument making such as automatic turning lathes, pivot burnishing machines, opticians' turret lathes, jig borers; hand tachometers. speed indicators, lathe chucks.

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INCLUDED also are several items that are being shown in the United States for the first time. Outstanding is a Bore Inspection Telescope for inspecting interior surfaces of tubes, pipes, forgings, cans, barrels, hollow sections of aeroplanes and other articles, in order to reveal any defects, wear, rust or imperfections. This is an important inspection tool for safety and preventive measures.

Wire Association Questions and Answers

Question 4250

Structural Changes in Tool Steel Due to Quenching

"We have the following problem:

A piece of tool steel, formed and shaped out of thin wire, is quenched from above its critical temperature into oil, thus becoming thoroughly hardened. The approximate analysis of the steel is: .95% carbon, .27% manganese, .25% silicon, .10% chromium, .10% nickel. What structural changes take place in the hardened steel if we cool it below room temperature, say down to dry ice temperature, which is about minus 70, and hold it at that temperature for a long time?

We wonder whether you can give us any information on this subject."

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Answer No. 1

"IN reply to your Question No. 4250 as to whether any structural changes will occur in a carbon tool steel when hardened in oil from above the thermal critical range and subjected for a long duration of time to a sub-zero temperature (—70°F), we wish to state that this sub-zero treatment will transform any austenite retained during quenching to martensite. Furthermore, it will also create a structural change in the martensite and, although it may not be observed microscopically at room temperature, it is denoted by the change in physical properties, such as hardness, impact and ductility. If tested at this sub-zero temperature instead of room temperature, a sharp drop in impact value results and fracture does not occur by shear as it would normally do at room temperature.

For further information concerning the effect of sub-zero temperature upon the physical characteristics of steel, may we refer you to the following publications:

(1) J. F. Cummingham & J. Gilchrist, "Impact Characteristics of Steel Rails at Low Temperatures". A. S. S. T., 1931.

(2) R. Sergeson, "Behavior of Some Iron & Steels under Impact at Low Temperatures". A. S. S. T., 1931.

(3) A. B. Kinzel, W. Crafts and J. J. Egan, "Fine-grained Structural Steels for Low Temperature Pressure Service". A. I. M. E., 1937.

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Answer No. 2

"WHEN any steel is cooled below room temperature, the lower the temperature the more brittle the steel becomes but when the steel is allowed to return to room temperature, its original degree of toughness returns. It is this fact that accounts for increased breakage of steel parts in the winter time. Metallurgical research seems to indicate that the nickel bearing steels lose less of their toughness with the same drop in temperature than other grades of steel but the nickel must be about 1% or more to be of any noticeable benefit in this respect. As far as the structure of the steel is concerned, it is not generally considered that any actual change takes place."

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Answer No. 3

"THIS question presupposes that the sample of thin wire would become thoroughly hardened when quenched into oil. We believe there is some question as to whether a piece of wire of this analysis would thoroughly harden even though it were quite thin. By thoroughly hardened, we assume that the wire is entirely martensitic, which is the hardest structure obtained by heat treating. If the wire were entirely martensitic after quenching, we do not believe that any change in structure would occur by cooling below room temperature."

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Answer No. 4

"WE have had no experience with this grade of steel, but in the opinion of our Metallurgical Department no structural change would take place even though the material is cooled to minus 70 degrees. They further state that the molecular activity would be decreased considerably, causing greater resistance to bending, which would tend to make this material more brittle at such a temperature.

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Question 5000

Formula For Elongation of Wire In Drafting

To The Wire Association:

Will you please publish a simple method for the determination of the percentage of elongation of wire in drafting.

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Answer No. 1

IN the slip machine the same weight of wire is passing every point in one unit of time. As the area is changed at each die the fpm must change, and this change is in inverse ratio to the squares of the diameters, and in the elongation.

You can read this off a slide rule, as follows:

Call the four scales on the rule A, B, C and D, top to bottom. Shove the slide to the left until your large size on scale C is over the small size on scale D. Then your 1 on scale A will be over some larger number on scale B, and this ratio will indicate the elongation.

Example, elongation going from .095 to .080. Set .095 on scale C over .080 on scale D. The 1 on scale A is directly over 1.4 on scale B. The wire has elongated from 1 to 1.4, or 40%.

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Question 5001

We would appreciate your advising what lubricants we could use to apply to coils of spring wire that we run through our coiling machines. At present, we use a mixture of oil and gasoline, which is applied to the coils with a brush, but some oil adheres to the springs, and while this is burnt off in the heat treating process, nevertheless there are occasions when we are called upon to furnish close wound springs that are not used as springs, and do not have to be heat treated. As the oil adheres to the finished product, this is an objectionable feature which we would like to overcome. Your suggestions, therefore, would be greatly appreciated.

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Answer No. 1

"IN further reference to your letter requesting proper lubricant for spring coiling machines, we find that a common machine oil is the one most widely used.

"This can either be applied to the bundle of wire or to a piece of cotton waste or felt attached to the wire just as it enters the machine.

"Our method is to attach a piece of felt to the wire and bind it tightly with soft wire. This felt is then soaked in oil occasionally by using a common oil can. As the wire passes through this felt, it picks up a slight film of oil which is sufficient in most cases.

"Your inquiry mentioned the fact that too much oil appeared on the spring after coiling. It would seem that a spring requiring no oil film should be coiled on a perfectly dry machine."

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Answer No. 2

"IN reply to your letter relative to applying oil to spring wire before it goes into a Spring Machine, we believe it will be possible for your friends to run the wire dry if they use Carboloy inserts on their guides in the tool holder, coiling points and arbor to overcome the difficulty you explain.

"It is the general practice of spring makers to use a mixture, half and half, of a cheap grade of machine oil and kerosene, and this is applied with a brush as you explain.

"We go one step further than this; where the wire enters our machines, we wire on a piece of soft felt. The purpose of this felt being to take off any excess oil and leave a very thin coating on the outside of the wire.

"This is all the information we have available on this subject, and trust it may be of some assistance."

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Answer No. 3

"REGARDING the question of the type of lubricants for use on coils of spring wire to be run through coiling

(Please turn to Page 280)

The Wire Association is for the specific purpose of improving production methods. It is organized as a clearing house of ideas on technical problems and research work in all phases of practical wire drawing and wire working.

The inquiries discussed are received from and answered by members of the Wire Association. These inquiries are sent to the Secretary of the Association who acts as a central clearing point, and neither the names of the firms nor individuals sending in the inquiry, nor of the men or firms replying are divulged without permission.

Exports and Imports of Wire

Exports of Iron and Steel Wire Products in Feb. 1939 and Feb. 1938
(In gross tons)

	FEB. 1939	JAN. 1939	FEB. 1938
Wire rods	360	353	783
Strip steel	8,056	7,225	7,036
Plain, black or galvanized iron or steel wire	3,822	4,140	2,749
Barbed wire and woven wire fencing	2,135	2,586	1,051
Woven wire screen cloth	143	143	113
Wire rope	379	242	218
Insulated iron or steel wire and cable—see analysis below			
Other wire and manufactures	450	570	483
Wire nails	1,176	1,528	1,145
Tacks	22	13	16
Other nails, including staples	252	309	146
Bolts, machine screws, nuts, rivets and washers	549	586	616
Total, these 11 classifications	17,344	17,675	14,356

Imports of Iron and Steel Wire Into the United States
(In gross tons)

Concrete Reinforcement Bars	162	365	263
Hollow bar and drill steel	63	100	103
Wire rods	711	1,196	588
Barbed wire	1,654	1,012	1,899
Round iron and steel wire	282	285	127
Telephone and telegraph wire	.....	1	2
Flat wire and strip steel	166	270	337
Wire rope and strand	134	240	165
Other wire	251	240	111
Hoops and bands	1,670	1,894	1,263
Nails, tacks and staples	796	553	898
Bolts, nuts and rivets	6	12	9
Total, these 12 classifications	5,895	6,168	5,765

Exports of Insulated Wire and Cable, February, 1939

	Foreign		To U. S. Possessions	
	Pounds	Dollars	Pounds	Dollars
Rubber covered wire	386,406	$ 81,357	140,501	$ 30,964
Weatherproof wire	192,086	27,705	75,593	14,195
Other insulated copper wire	341,790	63,494	110,543	17,240
Nickel-chrome electric resistance wire	39,263	45,215	.....	.....
Total, these 4 classifications	959,545	$217,771	326,637	$ 62,399

Exports

FOR the second consecutive month exports of scrap registered a decline in February—2,971 tons or to 224,913 tons. Employing another basis of comparison it may be noted that February scrap exports were only 87.5 percent as great as in February 1938 when shipments totaled 256,790 tons.

✦ ✦ ✦

OF the 222,704 tons of iron and steel scrap included in the February 1939 trade 169,729 tons went to Japan, 24,840 tons to Italy, 6,035 tons to the Netherlands, 4,039 tons to Mexico, 3,827 tons to Poland and Danzig, and 3,512 tons to Sweden.

✦ ✦ ✦

AT 134,777 gross tons exports of iron and steel products (other than scrap) from the United States in February were just 11 tons smaller than in January. There was, however, a decline of $441,840 in the value of this trade (or to $9,772,707 in February). A year ago—in February 1938—exports amounted to 203,850 tons valued at $12,643,356.

✦ ✦ ✦

IMPORTS of iron and steel products (scrap excepted) totaled only 17,736 gross tons valued at $1,236,673. February receipts were 6,595 tons and $492,472 less than those of January — 24,331 tons valued at $1,729,145—and were also smaller than the 19,589-ton ($1,414,688) trade of February 1938.

✦ ✦ ✦

SCRAP exports at 224,913 gross tons were 2,971 tons under the 227,884-ton January figure and were more than 30,000 tons less than the 256,790 tons exported in February 1938. February 1939 shipments were valued at $3,345,344 and those of January 1939 at $3,351,351.

✦ ✦ ✦

IN point of tonnage non-alloy "other plates"—20,324 tons—was the principal product exported in February, shipments of 9,997 tons having been made to the Netherlands, of 2,030 tons to Italy, and of 1,912 tons to Sweden. The trade in non-alloy black steel sheets—19,886 tons—included 6,270 tons which went to the United Kingdom; 2,378 tons to Brazil; and 2,356 tons sent to Canada. The principal markets in the 10,968-ton trade in tin plate were Uruguay, 2,022 tons; Brazil, 1,910 tons; and the Netherlands, 1,320 tons; while Japan took 9,256 tons of the 10,140 tons of non-alloy ingots exported during the month.

✦ ✦ ✦

OF the 10,140 tons of non-alloy steel ingots exported 9,256 tons went to Japan. Shipments of non-alloy, hot-rolled steel strip, however, were more widely distributed with the United Kingdom (3,199 tons) and Canada (1,334 tons) the leading markets in the 5,765-ton trade. Exports of plain structural shapes—5,603 tons—included 1,375 tons which went to Canada and 748 tons dispatched to Finland.

✦ ✦ ✦

JAPAN was February's leading market, her total of 18,149 tons including 9,256 tons of non-alloy and 3,332 tons of alloy steel ingots and 2,998 tons of pig iron. Shipments to the Netherlands—12,962 tons—included the 9,997 tons of "other plates" noted above and 1,320 tons of tin plate. Brazil was the month's third market with a trade totaling 12,301 tons including 2,378 tons of non-alloy black steel sheets and 1,910 tons of tin plate. Canada's purchases—12,092 tons in all—were comprised of a variety of items including 2,356 tons of non-alloy black steel sheets and 1,334 tons of non-alloy hot-rolled strip.

(*Please turn to Page 276*)

Exports and Imports of Wire

(*Continued from Page 271*)

Imports

IMPORTS of iron and steel products totaled only 17,736 tons in February—6,595 tons less than the January trade. Ferromanganese, in point of tonnage, was the principal product imported—the total of 2,889 tons received included 1,301 tons from Norway and 1,264 tons from Czecho-Slovakia. Belgium (1,850 tons) was the principal source of the 2,414 tons of structural shapes received, while Canada was the source of all save 3 tons of the 2,033 tons of spiegeleisen brought in. Of the 1,670 tons of "other hoops" imported 1,197 tons came from Belgium—Germany (1,034 tons) being the chief source of the 1,654 tons of barbed wire which entered this country during the month.

✦ ✦ ✦

BELGIUM was the chief source of imports in February—her total of 5,296 tons including 1,850 tons of structural shapes, 1,197 tons of "other hoops and bands", and 802 ton of "bars, whether solid or hollow". The principal products in the German trade of 3,632 tons were "other pipe", 1,043 tons; and barbed wire, 1,034 tons; while the 2,030 tons of spiegeleisen received from Canada featured the 2,267-ton trade with that country.

✦ ✦ ✦

MANY products went in to make up the 1,599 tons of iron and steel products received from Sweden with wire rods (521 tons) being the largest. Ferromanganese—1,301 tons—accounted for virtually the entire (1,310-ton trade with Norway).

✦ ✦ ✦

CARD CLOTHING receipts totaled 29,036 square feet valued at $45,052 against 20,675 square feet valued at $32,126, and came principally from the United Kingdom (27,257 square feet at $41,628), and Belgium (1,511 square feet at $2,849).

RECEIPTS OF WIRE HEDDLES—none.

✦ ✦ ✦

A TRADE of 42,286 square feet resulted in WIRE CLOTH AND SCREENING as against 90,010 square feet and came from Canada (17,058 square feet); Germany 14,127 square feet); and the Netherlands (8,110 square feet).

✦ ✦ ✦

FOURDRINIER AND OTHER PAPER-MAKING WIRE — none.

✦ ✦ ✦

RECEIPTS OF WIRE FENCING AND NETTING, galvanized before weaving amounted to 72,275 square feet against 1,068,986 square feet, and came from Belgium. Of that galvanized after weaving, the total was 498,600 square feet against 2,768,874 square feet, and came from Germany (285,000 square feet) and the Netherlands (210,000 square feet).

IN THIS BOOK
Clippers to cut steel as thick as your thumb — big powerful tools for heavy wrecking jobs. In-between sizes to fit every need. Special tools for cutting cable, flat stock, etc. Swivel head models — the "wrist action" tools which reach around corners at all angles. This catalog covers the entire Porter line. Tells about hardness of metals and the right cutting tools. It is yours for the asking.
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The Annual Dues Are $10.00
AND INCLUDE

1. A subscription for the period of the membership to the designated official publication of the Association, "WIRE AND WIRE PRODUCTS."
2. A copy of the annual WIRE BUYERS GUIDE AND YEAR BOOK OF THE WIRE ASSOCIATION.
3. A copy of the proceedings and discussions held at the annual meeting.
4. Co-operative and helpful information on processes and methods of production.

For Details Address

Richard E. Brown, Secretary,
The Wire Association
Stamford Trust Co. Bldg.
300 Main St., Stamford, Conn.

EXPORTS of iron and steel wood screws during February, 1939 totaled 16,940 gross, valued at $3,005. Of this total, the Philippine Islands took 3,206 gross valued at $550; Cuba, 2,824 gross valued at $430; Netherlands, 2,130 gross valued at $446; Canada, 2,056 gross valued at $161; Finland, 1,345 gross valued at $471; Nicaragua, 753 gross valued at $107; Brazil, 700 gross valued at $71; Haiti, 576 gross valued at $61.

✦ ✦ ✦

EXPORTS OF BRASS WOOD SCREWS during the same month totaled 8,128 gross valued at $3,066. Of this total Cuba took 4,925 gross valued at $1,392; the Philippine Islands, 1,281 gross valued at $680; Bermuda, 437 gross valued at $215; Panama, Canal Zone, 435 gross valued at $229; Canada, 315 gross valued at $91; Finland, 270 gross valued at $250.

✦ ✦ ✦

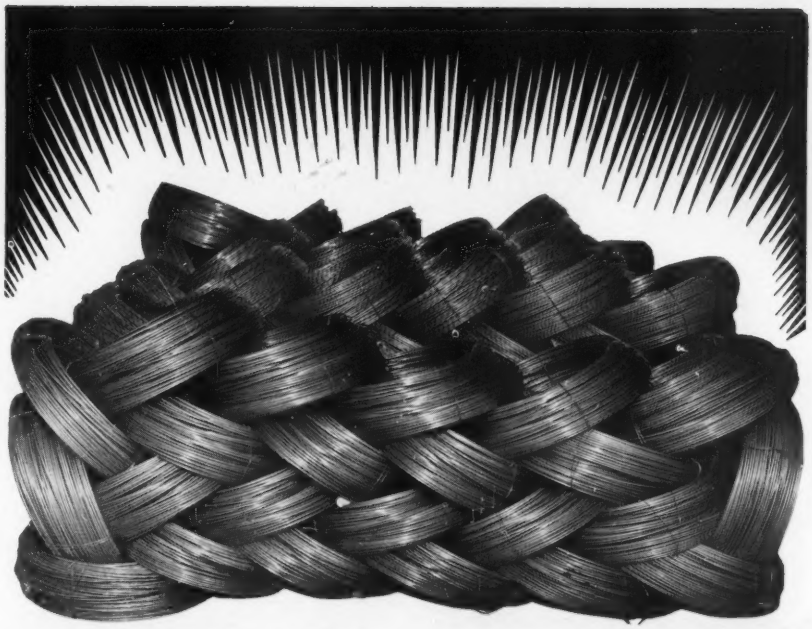
IMPORTS OF wood screws during the same month totaled 10,200 gross valued at $1,423. Of this total Germany supplied 5,200 gross valued at $443 and Belgium supplied 5,000 gross valued at $980.

✦ ✦ ✦

Colored Steel Spring Wire

AT the Leipzig Spring Fair coloured steel wire has been offered, but it is yet uncertain whether such wire will come into demand. Wire ropes and strand are very often sold coloured, i. e. one strand out of 6, 9 or more is coloured, but ordinary wire not yet. The makers expect however, that very thin wire (below SWG 31) for the florists and others will be readily bought in bright colours and some orders were already placed. The color is not painted on the steel but enamelled.

The Annual Convention of the Wire Association will be held at Chicago, Ill., October 23rd to 27th, 1939.



WIRE

To consider your special needs and problems in wire, all the skill and experience of our metallurgists are at your command. Perhaps—as has happened with many manufacturers—they can point the way to faster work, fewer rejections, lower costs, and a better, more dependable product. As specialists in low-carbon wire we often can furnish a combination of analysis and temper that simplifies fabrication and improves strength in the final product.

Besides special-analysis and copper-bearing steel wire Continental — and only Continental—offers wire of Konik, the patented new steel containing copper, nickel, and chromium. Konik's amazing amenability to carburizing and heat-treatment permits new peaks of hardness, toughness, and resistance to abrasion. Its economies have been proved in four years of use by a variety of manufacturers.

Among the finishes offered by Continental are bright, bright and black annealed; sull-coated; processed; galvanized, including Flame-Sealed; liquored, coppered and tinned in many modifications. Eight shapes are standard, and many specials available. Regular gauges run from No. 34 to 5/8 inch. Furnished in coils of suitable sizes, or cut and straightened to specification.

CONTINENTAL STEEL CORPORATION

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CONTINENTAL

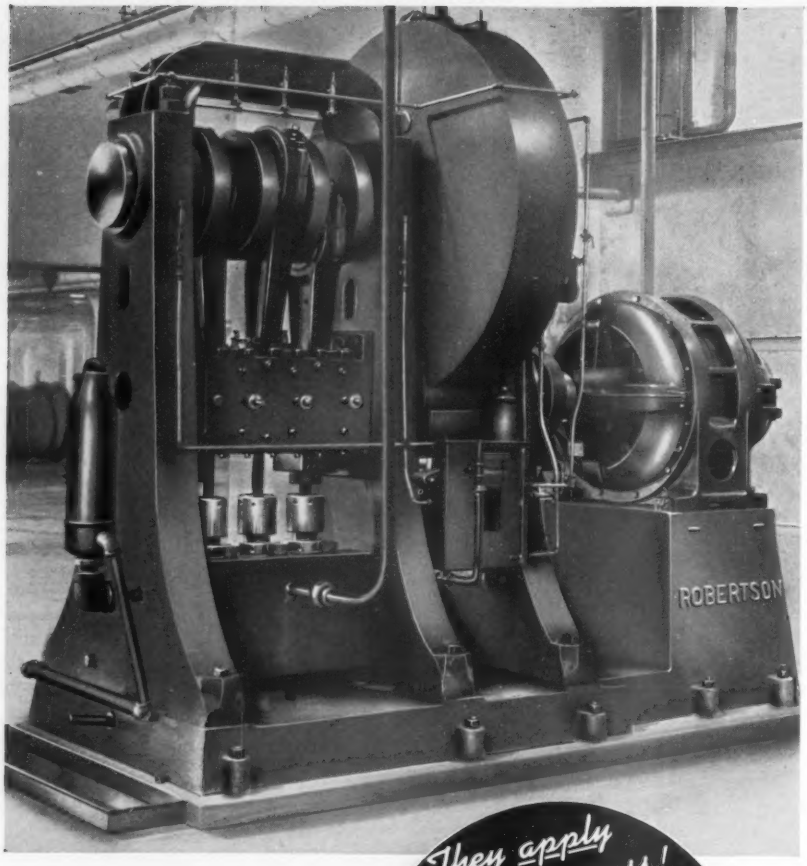
STEEL SHEETS AND WIRE PRODUCTS

Wire: Bright Basic, Annealed, *Konik, Special Manufacturers, Galvanized, *Flame-Sealed

Wire Rods, Nails, Staples, Bale Ties, Barbed Wire; Fence 15 Types; Gates and Fittings

Sheets: Black, Galvanized, Special Coated; Roofing and Siding 14 Styles

*Trade Mark Registered, U. S. Patent Office



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Vascoloy-Ramet Opens Eastern Plant

A NEW plant for the manufacture of tantalum carbide wire, tube, sectional and shape dies, cutting tools and blanks, has just been put into operation by Vascoloy-Ramet Corporation, North Chicago, Illinois.

✦ ✦ ✦

THE plant, located at 415-421 Tonnelle avenue, Jersey City, New Jersey, occupies an entire one-story brick and steel building of approximately 6,000 sq. ft. floor space. The plant is on U. S. Highway No. 1, near the intersection of Pulaski Skyway, and a few blocks from the Journal Square tube station, affording convenient highway, rail and air connections with the industrial east.

✦ ✦ ✦

EXCEPT for the primary processing of carbide materials which are received from the parent plant at North Chicago, the New Jersey plant is a complete production unit for Vascoloy-Ramet products, equipped with new and advanced facilities for manufacturing, casing, finishing and recutting all types of sintered carbide dies. Equipment is also to be installed for production, brazing and finishing of blanks and cutting tools.

✦ ✦ ✦

OPERATIONS are under the direction of John Kontra, Joseph Hall and John Adler, who were formerly associated with Union Wire Die Company. District sales and service are handled by Hayden G. Fulton, transferred from North Chicago, main plant. Teletype service has been installed for rapid exchange of forder, engineering and delivery information with customers, and with the general offices in North Chicago.

For Information
Regarding
The Wire Association
Address

Richard E. Brown, Secretary
Stamford Trust Co. Bldg.
300 Main St., Stamford, Conn.

Employees' Edition of Corporation Annual Report

THE Wolverine Tube Company, Detroit, Michigan, recently sent out an Employees' Edition of the 1938 Annual Report of Wolverine Tube Company. This Employees' Report contained a balance sheet with explanatory notes showing the amount of investment per employee, covering the reserves, bills receivable, cost for raw material, investment in land, buildings, machinery and other equipment necessary to carry on the business, etc., showing what the company had invested per employee and for the purpose of assuring jobs to the employees and to perpetuate the business. The Report contained a statement of the expenses per sales dollar necessary to carry on the business, showing that out of every sales dollar, so much was expended for labor to manufacture and sell its products, so much of every sales dollar went for taxes, which amounted to several hundred dollars per employee.

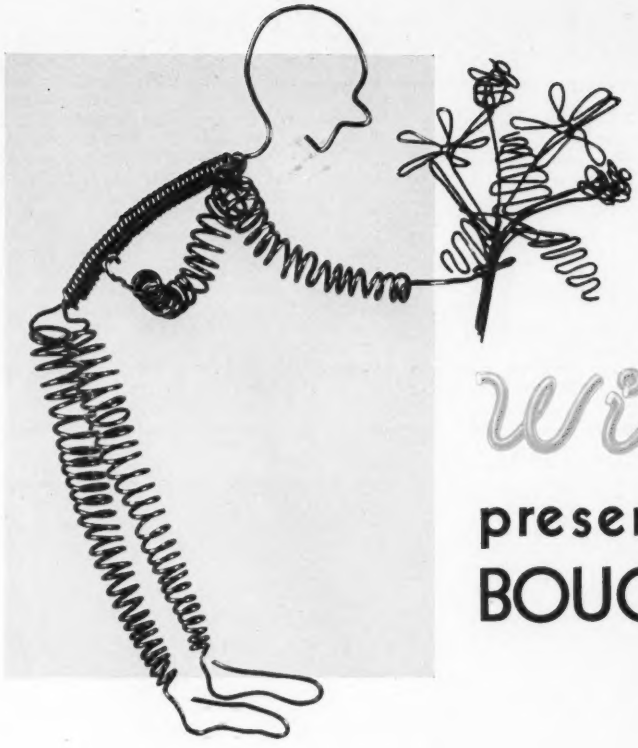
✦ ✦ ✦

THE most interesting section of the Report was the letter to the employees by the management drawing attention to the fact that, except in rare instances, no one person had sufficient money to finance a large business and it was, therefore, necessary to go to the general public and ask for use of its savings. In return, stock was issued and, if a profit was earned, the stockholders were paid for the use of their money in the form of dividends. This section of the letter was concluded as follows: "Without the stockholder and the money he gives us, Wolverine would have to grow very slowly and our jobs would be fewer and more uncertain. Therefore, the management is very definitely responsible to them."

✦ ✦ ✦

THE letter then stated that the management had an equally definite responsibility to the factory and office employees who invest their time, labor and brains in the business, and that the wage

(*Please turn to Page 282*)



Wire presents a BOUQUET

— an offering to delight the production man's heart. It's wire with a sweet balance of qualities individually set up for your requirements — analysis, working qualities, finish, that mean smoother output, a better product. And the sweetest flower of all is UNIFORMITY — from one order to another — next month, next year — five years from now. Keystone's hard-boiled laboratory technicians see to that.

If this interests you, say so. We'll welcome an invitation to call and explain.

SAMSON SPRING WIRE
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KEYSTONE STEEL & WIRE CO. PEORIA, ILL.

HIGH CARBON or LOW CARBON

Bright . . . Tinned
Coppered
Annealed
Galvanized

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'Round the World With the Wire Industry

Of Interest To Wire Exporters

A CURRENT letter from an English member of the Wire Association on the subject of competitive export prices includes the comments below. Here's something for export sales managers to think about!

✦ ✦ ✦

"With great respect we have a grouse against America, especially in the world trade as reference to the export market. I do not know whether you are aware, but we British manufacturers have an export agreement working with all Continental manufacturers of wire as regards agreed selling prices in various markets, quotas in various markets and altogether it is a very satisfactory arrangement. About eighteen months ago we approached the American wire manufacturers as part and parcel of the Iron and Steel trade to which like agreements referred, and the Americans gave us their word to agree with

(Please turn to Page 286)

New principles of mechanical design plus heavy, rigid construction make possible the high-speed precision performance of TORRINGTON Spring Coiling Machines . . . REDUCE COSTS . . . ENHANCE QUALITY . . . INCREASE PROFITS.

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Polish Steel Capacity Augmented By Former Czech Plants

SITUATED in the Teschen area ceded to Poland by Czecho-Slovakia, the blast furnaces and steel works of the S.A. Berg und Huttenwerk Gesellschaft at Trzyniec are estimated to increase the capacity of the former Polish steel industry by some 30 percent while representing a reduction of 25 percent in the capacity of the former Czech steel industry. The Trzyniec plant consists of four blast furnaces of, respectively, 210, 280, 330 and 650 tons daily capacity (a total of 650,000 tons annually), 12 45-ton Martin furnaces, one Wellman-Seever tilting furnace, and one electric furnace (a total steel capacity of 600,000 tons per year), and a rolling mill of eight stands including what is described as "the most modern draw roller for plate manufacture in Europe". A second (independent) iron and steel plant, the "Alfred Hahn" situated in Bogumin, is comprised of one blast furnace, four Martin furnaces with a combined annual capacity of 150,000 tons, and a pipe mill the output of which is stated to exceed the combined production of all original Polish pipe mills. (Office of the American Commercial Attache, Warsaw.)

✦ ✦ ✦

Chrome-Copper Steel

THE October 24, 1938, "Japan Advertiser" described the invention by Dr. Masayoshi Tagaya of a chrome-copper steel which is claimed to have "greater corrosion-resisting capacity" than the chrome-nickel steels which it aims to replace. Its manufacture is described as involving the uniform diffusion of a fine powder of 15 to 20 percent chrome and 10 to 15 percent copper (presumably of the finished steel) into a non-alloy steel through a special smelting process. No technical details of the process were given. (Office of the American Commercial Attache, Tokyo.)

Mexican Iron and Steel Market In October

THE office of the American Commercial Attache at Mexico City has supplied an interesting report covering the Mexican market for iron and steel and hardware products in October including notes on domestic production, etc. Copies are available for loan to interested American readers of the "Fortnightly". Reference should be made to report No. 29861.

✦ ✦ ✦

Wire Cartel Extended

THE International Drawn Wire Cartel has been extended until the end of 1940. Resolution of the difficulties within the French and Belgian wire industries made possible this two-year extension.

✦ ✦ ✦

Light Guards

A CLIPPING from the "Japan Advertiser" of November 23 reports the invention by a Mr. Kyusaburo Mori, an engineer of the Asahi Iron Apparatus Works, Amagasaki, of a device resembling a venetian blind which permits the operation of blast furnaces and steel works during "black-out" periods. The device permits the circulation of air while shutting off unwanted light. (Office of the American Commercial Attache, Tokyo.)

✦ ✦ ✦

Japan Tightens Sales Control

UNDER regulations promulgated by the Department of Commerce and Industry on November 21, the purchase of scrap iron (other than that for munitions, etc.) from dealers other than the Japan Scrap Iron Control Company and designated companies is prohibited. Distribution quotas will be set by a Scrap Iron Demand and Supply Adjustment Council. A "coupon system" will become effective on December 1 against scrap for remelting and on January 1, 1939, for scrap for other uses. Authority is also given the above ministry to fix sales prices and terms and to order holders of scrap to transfer their holdings to Japan Scrap Iron Control Company. (Office of the American Commercial Attache, Tokyo.)

Welsh Firms Merge

FIVE Welsh tin plate companies are reported to have merged in anticipation of the imminent entry of the Ebbw Vale mills of Richard Thomas & Company into production. The firms in question are Ashburnham Tinplate, Burry Port, Carmarthen; Kidwelly Tinplate, Kidwelly, Carmarthen; Old Castle Iron and Tin Plate, Llanelly; Western Tin Plate Works, Lanelly; and Tielo Tin Plate, Pontardulais, Glamorgan. All are of the "older type" using the hot process and may experience difficulty in competing with the modern cold reduction plant being installed at Ebbw Vale. (Office of the American Commercial Attache, London)

✦ ✦ ✦

Austrian and Sudeten Wire Mills

ADDITION of the wire rope plants of Austria and the Sudetenland to the German industry, although increasing capacity, has also created certain problems. The Sudetenland plants

(*Please turn to Page 280*)

THE WATSON MACHINE COMPANY

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Standard Sizes For From 5 to 1000 Pound Spools
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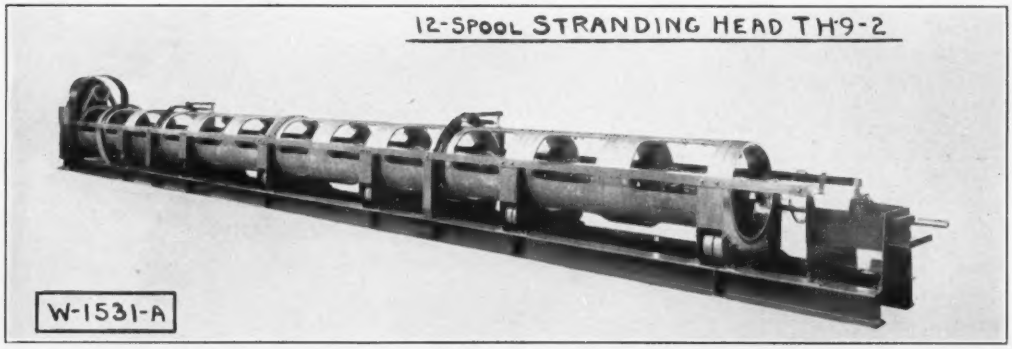


ELECTRICAL WIRE, CABLE & WIRE ROPE MACHINERY

Printed Literature Available On Considerable Of The Equipment Used In These Fields—Inquiries Are Invited

A Review of Recent Wire Patents

No. 2,149,436, MANUFACTURE OF WIRES OF MAGNESIUM OR ALLOYS THEREOF. Patented March 7, 1939 by Hans Hadenfeldt, Berlin, Germany, and Bernard Blumenthal, New York, N. Y.

The process comprises cold drawing the wire by passes, each effecting a reduction in the diameter of the wire not exceeding 20%.

✦ ✦ ✦

No. 2,149,771, ELECTRIC CABLE, Patented March 7, 1939 by Philip Vassar Hunter and Leslie Giddens Brazier, London, and Harry Hill, Kent, England, assignors to Callender's Cable and Construction Company Limited, London, England, a British company.

Paper or the like is applied to the wire conductor to form a smoothing layer and over this a smooth lapping of metal tape is disposed to form a non-circular and elastic metal surface, to which the dielectric material is applied.

✦ ✦ ✦

No. 2,149,772, ELECTRIC CABLE, Patented March 7, 1939 by Philip Vassar Hunter. London, and Harry Hill, Belvedere, England, assignors to Callendar's Cable and Construction Company Limited, London, England, a British company.

The basic feature of the invention is the use of solid rods of non-circular cross section to form the cores of a two or more cores cable.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

No. 2,149,834, WIRE FABRIC, Patented March 7, 1939 by Ernest Linwood Blackburn, Philadelphia, Pa., assignor to Korb-Pettit Wire Fabrics & Iron Works, Inc., Philadelphia, Pa., a corporation of Pennsylvania.

This wire fabric is especially adapted as a conveyor belt and comprises two series of transverse rows of short wire lengths arranged with the lengths of successive rows interlapping, and with those of each series in the same plane and forming one face of the fabric, and integrally connected to the lengths of the other series; and transverse wire strands extending between the wire lengths of the two series, and each interconnecting the wire lengths of two successive rows with those of the adjacent two successive rows.

✦ ✦ ✦

No. 2,149,851, APPARATUS FOR HANDLING COILED WIRE AND ROD, Patented March 7, 1939 by Lester R. MacLeod, Ardsley, N. Y., assignor to Anaconda Wire & Cable Company, New York, N. Y., a corporation of Delaware.

A take-off mechanism is provided for the completed coils which permit their removal while the coiling apparatus is running at top speed and without interruption.

✦ ✦ ✦

No. 2,149,941, COILING MACHINE, Patented March 7, 1939 by George M. Prentice, Holyoke, Mass., assignor to White & Wyckoff Mfg. Co., Holyoke, Mass., a corporation of Mass.

A coiling and cutting machine is provided and claimed to be so constructed as to operate at high speed.

✦ ✦ ✦

No. 2,149,942, COIL FORMING MACHINE. Patented March 7, 1939 by George M. Prentice, Holyoke, Mass., assignor to White & Wyckoff Mfg. Co., Holyoke, Mass., a corporation of Mass.

The invention lies in the provision of new means for controlling the length of the coil being formed.

✦ ✦ ✦

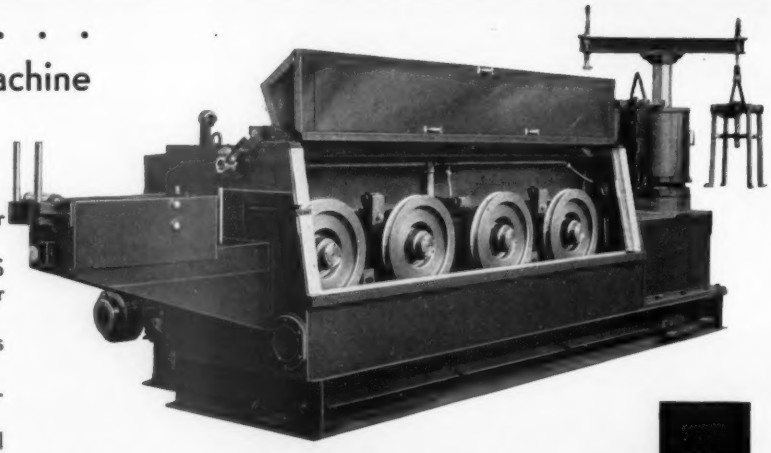
Reissue No. 21,028, METHOD AND APPARATUS FOR JOINING WIRE CLOTH, Patented March 14, 1939 by William E. Buchanan, Appleton, Wis., assignor to Appleton Wire Works, Inc., Appleton, Wis., a corporation of Wisconsin.

The method comprises holding two cloth ends in adjacent relation with their edges spaced apart, progressively guiding a strand to a position between the edges, progressively bringing the cloth

Announcing . . . . . .
the Syncro type H. F. Machine
for finishing heavy wire

Brief Specifications

1. Enters nickel silver, brass, bronze or copper rod up to 7/16" diameter.
2. Finishes wire in coils to #8 B & S Gauge at speeds up to 1,000 feet per minute.
3. Can be equipped with 9, 11 or 13 dies — each die pressure cooled.
4. Finishing die is revolving type, individually motor driven.
5. Coiler block is equipped with internal type double stripper and air operated hoist.
6. Main motor drive is directly coupled to draw blocks through worm and spur gears.
7. Maximum power of main driving motor 250 H.P.
8. Floor space required 16 ft. long x 6 ft. wide. Net weight 35,000 lbs.



The Syncro type H.F. Rod Breakdown Machine is compact and completely accessible, and its modern, efficient design incorporates every feature required in producing coils of uniformly high quality wire.

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420 Lexington Avenue New York

edges against the strand, and uniting the cloth edges and interposed strand by the application of heat.

✦ ✦ ✦

No. 2,150,647, WIRE SCREEN, Patented March 14, 1939 by Eldridge P. Douglass, Fayetteville, Ark.

A fine mesh screen is provided, woven from thread-like wire, and warp strands extending continuously along lines parallel to the length of the screen, and the woof wire extending continuously along lines which are parallel and deviate a substantial amount from a ninety degree angle with the woof wires, the warp and woof wires being interwoven but otherwise not deviating from substantially straight lines.

✦ ✦ ✦

No. 2,150,901, RUSTLESS IRON, Patented March 21, 1939 by William Bell Arness, Baltimore, Md.

An alloy is provided comprising about 9% to 30% chromium, 5% to 15% nickel, .005% to .035% nitrogen, .02% to .07% carbon and the balance iron.

✦ ✦ ✦

No. 2,150,934, HOT STRIP COILER, Patented March 21, 1939 by Edward N. Millan and Edwin B. Hudson, Middletown, Ohio, assignors to The American Rolling Mill Company, Middletown, Ohio, a corporation of Ohio.

The inventors have eliminated bending rolls and associated guiding means and have provided a new method of entry of the leading end of the strip into the coiler.

✦ ✦ ✦

No. 2,151,776, METHOD AND APPARATUS FOR FORMING METAL SCREW BLANKS, Patented March 28, 1939 by Herman Koester, Waterbury, Conn., assignor to The Bristol Company, Waterbury, Conn., a corporation of Conn.

This machine is said to be adapted to form conventional screw blanks from cylindrical blanks.

✦ ✦ ✦

No. 2,151,874, METHOD OF MAKING WIRE DRAWING DIES AND OTHER ARTICLES, Patented March 28, 1939 by Leon Simons, Bronx, N. Y., assignor to Master Wire Die Corp., New York, N. Y., a corporation of New York.

Wire drawing dies are made without using any binder with the refractory material, such as tungsten carbide, boron carbide and the like.

✦ ✦ ✦

No. 2,151,913, WIRE BELT, Patented March 28, 1939 by Noah S. Harter, Waukegan, Ill., assignor to Cyclone Fence Company, a corporation of New Jersey.

This belt is adapted to work under tension transmitted transversely through the coils by way of their convolutions and having cross wires extending the lengths of at least some of the coils, each of the cross wires being positioned free from the intermeshing portions of the convolutions of the coils and being fixed to both ends of the coil with which it is associated to prevent contraction of the coil when the belt is tensioned.

✦ ✦ ✦

No. 2,152,396, WIRE DRAWING LUBRICANT AND METHOD, Patented March 28, 1939 by Robert C. Williams, Columbus, Ohio, assignor to The Ironsides Company, Columbus, Ohio, a corporation of Ohio.

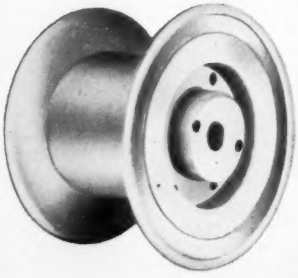
A compound is provided for treating steel wire or rod preparatory to a die drawing operation thereon, comprising a liquid body having uniformly dispersed therein lime, a protein dispersing agent and a lubricant.

✦ ✦ ✦

Engineering Data on Tube Alloys

TUBE designer and production engineer alike will welcome the practical engineering data on tube alloys compiled by the Technical Department of the Driver-Harris Co., Harrison, N. J. In loose-leaf form, this data simplifies otherwise laborious calculations by providing derived constants in the shape of tables and formulae. General characteristics of various D-H filament alloys are given. Handy conversion tables are included. Users of D-H alloys are provided with filament specifications for different melts they are using. Data on grid alloys, including curves on sag characteristics, will prove of great help to the tube engineer. This information is available to engineers identified with tube designing or manufacturing, and is not intended for general distribution.

FINE WIRE HIGH SPEED WIRE DRAWING SPOOLS



James Day (Machinery) Ltd.,
Sentinel House,
Southampton Row,
London, W. C. I, England.

MOSSBERG **PRESSED STEEL** CORP.

Announces a complete line of HEAVY DUTY PRECISION SPOOLS and REELS especially designed for high speed wire drawing and annealing.

The degree of efficiency obtained by the HIGH SPEED WIRE DRAWING MACHINE is largely dependent upon the accuracy and durability of the take-up spool.

The use of our PRECISION SPOOLS will increase your machine efficiency and eliminate your spool difficulties.

Complete range of sizes.

MOSSBERG
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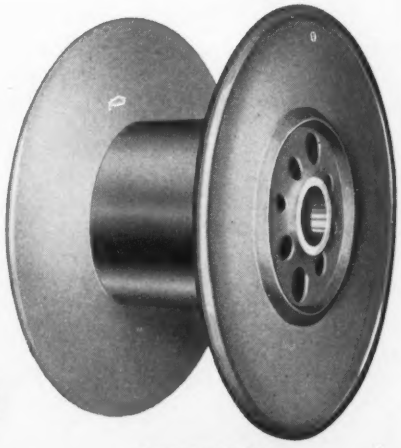
18 West Street,
ATTLEBORO, MASSACHUSETTS, U. S. A.



COMBINATION
500 lb. CAPACITY WIRE DRAWING — ANNEALING — STRANDING — REEL.

Have You

Corrosion Spots

before your eyes?

• Is your maintenance man — or production man — calling your attention to "Spots" of corrosion?

• Many of these troublesome areas in the plant can be eliminated by using equipment that is resistant to corrosion.

• Everything we make is for the purpose of handling corrosive liquors. For instance: many strip mills are using Duriron pumps for pumping pickle liquor from the pickler to neutralizing tanks. Other mills use Duriron steam jets to heat, circulate and agitate the liquor. A wire mill is using Duriron for saddles and bars in their cleaning vat.

• For the sulphuric or hydrochloric acid in your mill, we can supply you with acid-resisting equipment that will handle it economically—from tank car to final disposal.

• It costs less to eliminate the "Spots" of Corrosion with Duriron Equipment.

Write today for bulletins

THE DURIRON COMPANY, Inc.

445 North Findlay St. Dayton, Ohio

BELL-MINE ROTARY KILN PULVERIZED LIME

MANUFACTURED BY THE WARNER COMPANY (BELLEFONTE DIVISION) AT BELLEFONTE, PA. SALES OFFICES AT PITTSBURGH, NEW YORK CITY, PHILADELPHIA AND WILMINGTON

WARNER COMPANY Lime Bell Mine Products BELLEFONTE DIVISION

for wire drawing

'Round the World With The Wire Industry

(*Continued from Page 277*)

present no real problem, it is reported, and only one of the two plants in this territory will continue to operate. Higher production costs in the 5 Austrian plants, however, present a difficult price problem, but with the recent adherence of these plants to the German wire rope cartel a speedy solution is anticipated.

(*Please turn to Page 288*)

✦ ✦ ✦

NINE-MONTH German wire rope exports totaled only 11,122 metric tons valued at Rm. 5,763,000 (1938) against 14,994 tons valued at Rm. 6,326,000 in the comparable 1937 period. (American Consulate, Cologne)

✦ ✦ ✦

Wire Association Questions And Answers

(*Continued from Page 270*)

machines, we have had no experience. We do have a suggestion which may be worthwhile trying out. To overcome the objectionable feature of an oil film on the finished product we would suggest dipping the coil, prior to running through the coiling machine, in a hot 2 to 5% solution of ordinary soap flakes. The heat of the coil will drive off the water and leave a thin dry soap film which may prove satisfactory as a lubricant. There are also water soluble compounds marketed by lubricant manufacturers which will deposit dry lubricating films.

"Our opinion is that dilute water solutions of wire drawing soap would afford adequate lubrication, would avoid the fire risk associated with the present use of gasoline solution of oil, and would leave a finish which would end up with a dry surface on the wire rather than an oily surface. The one possible objection of this method might be to the use of water, which of course is going to necessitate some means of drying."

✦ ✦ ✦

The Business of National Defense

(*Continued from Page 264*)

us so well in peace and in war. Ours is a government based on the consent of the governed. Ours is a society of cooperative individuals. Let those who do not understand the genius of our people and the spirit of our institutions not misjudge our motives and our intentions. We believe in peace but we are determined to protect our peace We are a free people, voluntarily united in the cause of national defense. What we have, we shall hold, protect and maintain.

Information on Inventions and Patents

"GENERAL Information Concerning Inventions and Patents" is the subject of a booklet recently published by Lancaster, Allwine & Rommel, Patent Attorneys, 473 Bowen Building, Washington, D. C. As an insert it contains a "Schedule of Government and Attorney's Fees" in patent cases relating to inventions. The subject of Registration of Trade-Marks and Copyrights is also briefly treated in the booklet which is mailed on request.

✦ ✦ ✦

Indexed List of American Standards

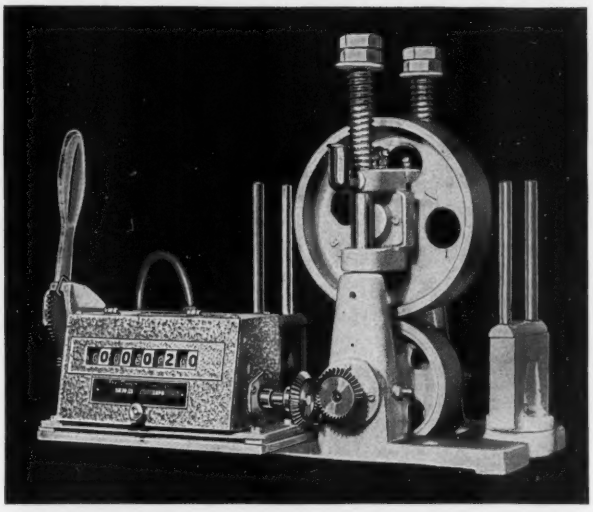
THE new annual list of American Standards and Safety Codes has just come from the printer. The list includes some four hundred nationally approved standards, safety codes, and specifications indexed alphabetically and also industrially according to subject. These cover work in the fields of civil engineering, mechanical engineering, electrical engineering, automobile and aircraft, transportation, ferrous metallurgy, non-ferrous metallurgy, chemical industry, textiles, mining, wood, paper and pulp, petroleum products, symbols and abbreviations, etc. The list may be obtained free of charge by writing to the **American Standards Associations, 29 West 39th Street, New York, N. Y.**

✦ ✦ ✦

IN each case these standards represent general agreement on the part of maker, seller, and user groups as to the best current practice in the industries or processes that the standards cover. More than 600 trade, technical, and governmental groups have taken part in this work.

✦ ✦ ✦

WHILE not included in this index, copies of many foreign standards and specifications are available from the American Standards Association for sale or loan upon request, and in some cases English translations may be obtained.



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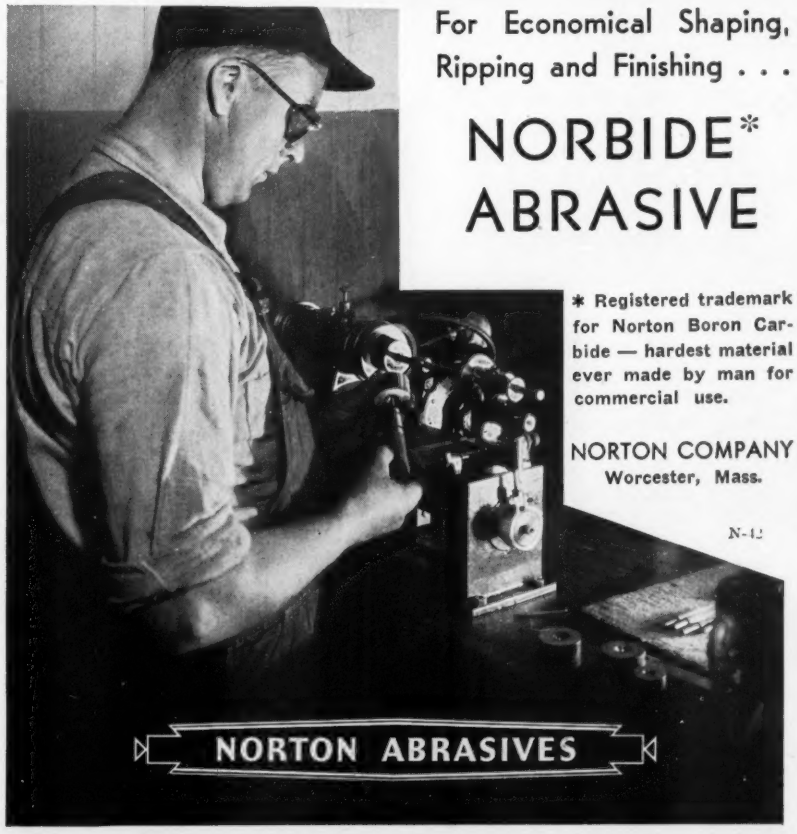
Wire Measuring Machine for Every Purpose

The recent addition of several new models enables us to offer wire and cable manufacturers and users, machines for the fast, accurate lineal measurement of any kind of bare and insulated wire, twisted pairs, wire rope and lead-covered or armored cable. Capacities .005" dia. and up.

Write for bulletin giving description and prices of Productimeter Wire Measuring Machines and Braiding Machine Counters.

DURANT MFG. CO.

1918 N. Buffum Street, Milwaukee, Wisconsin
176 Eddy Street, Providence, Rhode Island



For Economical Shaping, Ripping and Finishing . . .

NORBIDE* ABRASIVE

* Registered trademark for Norton Boron Carbide — hardest material ever made by man for commercial use.

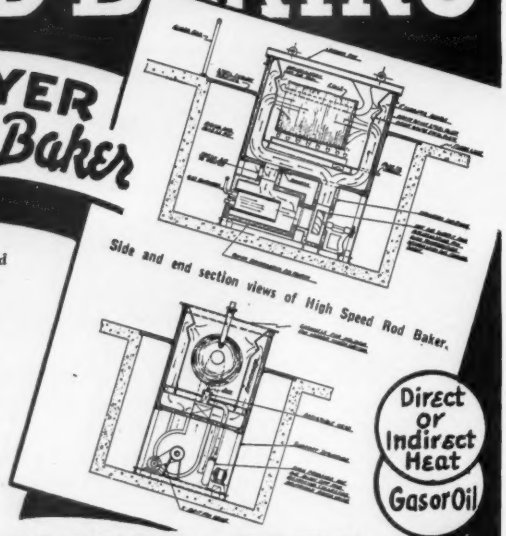
NORTON COMPANY
Worcester, Mass.

N-42

It will "show you something"
in ROD BAKING

CARL-MAYER "Hi-Speed" Rod Baker

Patents Allowed and Patents Pending



Side and end section views of High Speed Rod Baker.

It is backed by 20 years' experience and a reputation for advanced engineering and dependability in industrial oven construction . . . Write for literature today.

Direct or Indirect Heat

Gas or Oil

THE CARL-MAYER CORP.

ROD BAKERS ~ OVENS ~ AIR DRAW FURNACES

3030 EUCLID AVENUE ◇ CLEVELAND, OHIO

THE letter concluded with a statement that the chief concern of management was to plan for the best uninterrupted annual wage for both jobholder and stockholder by giving the best quality of product and service at the lowest cost to insure the best price to the customers. Then Wolverine can be sure of its share of the market.

✦ ✦ ✦

Peruvian Demand for Shapes And Bars Good

ALTHOUGH no appreciable improvement in imports of structural shapes and bars is indicated by customs figures, the office of the American Commercial Attache at Lima describes dealers as reporting a sustained demand for these items. A copy of the report (No. 29639) discussing this market is available for loan to interested American readers.

A BIG MESSAGE
in little space:

Whatever your pickling problem may be, there is a grade of RODINE, the world-wide inhibitor, that will give you perfect pickling. Our laboratories work unceasingly in your service —and without charge.

If you have any metal-treating problem — pickling, cleaning, rust-proofing, painting — we will gladly work with you to solve it.

American Chemical Paint Co.

Box 306, AMBLER, PENNA.

Detroit, Mich. Walkerville, Ont.

Employees Edition of Corporation Annual Report

(*Continued from Page 275*)

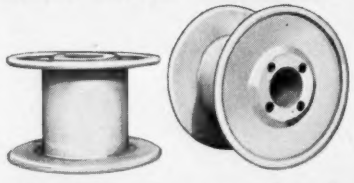
returns to jobholders are usually far greater than the dividends to stockholders.

✦ ✦ ✦

ONE of the main features of the letter was a paragraph which dealt with the importance of the customer group: "There is a third group, the most influential group in any business — the customers for whom the jobholder and the stockholder are really working. Without customers, there would be no Wolverine Tube Company. There would be no Wolverine jobs for any of us. If the customer does not find the quality he wants in Wolverine products at a price he finds by comparison with competition is reasonable, and a service that is satisfactory, he buys elsewhere. Therefore, we must all strive to satisfy the customer in order to safeguard our jobs and the money that makes our jobs possible".

APCO MOSSBERG

STEEL REELS & SPOOLS



For The Copper, Steel, & Wire Rope Industry

Apco Mossberg Steel Reels are standard equipment in the wire industry—and for good reason! Apco Mossberg—the original Frank Mossberg Co.—**originated** the steel reel idea and have been training workmen in their manufacture ever since. Personal attention by Apco Mossberg engineers make each job a "special".

FREE ENGINEERING SERVICE

We will gladly submit drawings, blueprints, or suggestions without obligation to you. Write for quotation today.

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(The Original Frank Mossberg Co.)

21 Lamb Street, Attleboro, Mass.

TUNGSTEN CARBIDE
DIES BY WILLEY'S

A SPECIAL Grade of Tungsten Carbide, (covered by U. S. Patents) with the proper characteristics for Dies—free from porosity—offers great resistance to abrasion and takes a polish equal to diamonds.

These and other important characteristics make this metal ideal for sizing, extrusion and wire drawing Dies.

Sales Engineers in principal cities.

Write for bulletin showing specifications and latest prices.

WILLEY'S
CARBIDE TOOL CO.
MANUFACTURERS AND SPECIALISTS IN
TUNGSTEN CARBIDE TOOLS
1340 W. VERNOR HIGHWAY • DETROIT, MICHIGAN

Dies for
High Speeds
Long bearing Dies
Short bearing Dies
Special bearing Dies
FAMOUS
WIRE DRAWING DIAMOND DIES
VIANNEY
250 E. 43rd St. • New York
Largest Stocks in U.S.A.
Quickest Deliveries
Safest Guarantees
Best Selections
Lowest
Costs

The Production of Molybdenum And Tungsten Wire

(*Continued from Page 260*)

in. diameter tungsten wire mentioned above would be sold as tungsten wire weighing 0.30 milligram per 200 millimeters. It is interesting to note that each of the pure metal ingots entering the swaging furnaces emerges from the final wire draw as approximately one million feet of finished wire. So much for wire fineness, but how about accuracy in meeting customers' exacting wire size requirements with narrowly limited tolerances? A custom made final drawing "order" die is made and carefully polished to size using the wire weight of wire drawn through it as a check. Once placed in operation its accuracy is unquestionable, repeated check weights on the wire passing through it guarantees that its accuracy will remain unquestionable.

✦ ✦ ✦

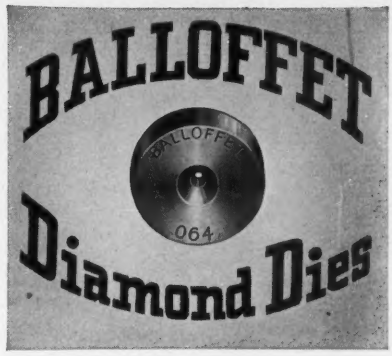
SIRIAN'S tungsten wire finds its greatest use in the filaments of incandescent lamps and radio tubes; this use is dictated largely by the fact that tungsten has the highest melting point commercially known. Molybdenum is used in making radio tube grids and grid supports, its use for this purpose being based on its high melting point and its electrical characteristics. Similar reasons call for its use as hooks on supports in incandescent lamps and as resistance windings in high temperature electric furnaces.

✦ ✦ ✦

IT is particularly significant that the most exacting heat-treating requirements of tungsten and molybdenum are so perfectly fulfilled by the use of gas-fired equipment—it is indeed a compliment both to the fuel itself and to the success of the gas equipment manufacturers in developing superlatively fine industrial equipment.

✦ ✦ ✦

TWO additional pack-heating furnaces were added to feed the new 2-high mills. They are double-chamber type furnaces, each 55 ft. long. At the last hot mill stand a return conveyor was built to take packs from this mill directly to the back of the furnaces for the final pass.



Skill and accuracy in manufacture with the use of selected stones make Balloffet Diamond Dies the choice of the most critical users.

•

Quality Diamond Dies
Since 1870

BALLOFFET
DIES AND NOZZLE CO., INC.
45-47 Adams Street
Guttenberg, New Jersey

There is **MORE** quality in the diamonds used for making Rusch Wire Dies,

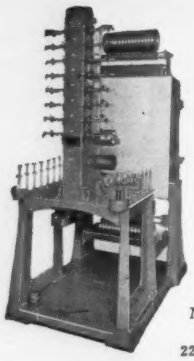
MORE accuracy in making Dies the Rusch scientific way,

MORE uniform wire produced throughout the life of Rusch Wire Drawing Diamond Dies!

YET prices are low and service always dependable.

For further particulars address

RUSCH WIRE DIE CORP.
275 Seventh Ave., New York, N. Y.



AIMCO R-16 MODEL
WIRE ENAMELING MACHINE

Enamels Wire 36 B. & S. Gauge and Finer.
Electrically Heated Oven with Thermostatic Control.
Finished Wire Spindles Individually controlled.
Traverse is Adjustable for Different Spool Dimensions.
Low Cost of Enameling Wire is Due to Ease of Operation and Number of Spindles one Operator can tend.
Self-Contained on Bed-Plate.
Motor Driven.
Motor included.

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WIRE NAIL MACHINERY

These machines are made in eleven different sizes. This enables us to cover any size of nail most efficiently.

GLADER Nail making machines have been adopted as standard equipment in all recent major nail mill installations.

For further information, prices, etc., write to us.

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Try WAYNE Wire Dies

Wire Drawing Diamond Dies

Wire dies by Wayne embody all the essentials necessary (quality stones — experienced workmanship — the most rigid of inspection) to assure accuracy plus long-life at high speed. Try Wayne dies today—see for yourself why drawers of wire acclaim *"Wayne the best die value obtainable."*

WRITE TODAY FOR OUR PRICES

Wayne Wire Die Co., Inc. 57 SHERIDAN ST., IRVINGTON, NEW JERSEY

Manufacturers of materials, tools and equipment for wire drawing and forming plants are constantly making improvements and additions to their lines. If you do not find the product or service in which you are interested, additional information will be supplied promptly. Simply address:

WIRE & WIRE PRODUCTS

Stamford Trust Co. Bldg.,
300 Main St. Stamford, Conn.

Pointers for Fencing Salesmen

(*Continued from Page 257*)

ber, size and shape of fields on a particular farm from the standpoint of economy of fencing may not always be the most practical from the standpoint of land utilization and farm organization."

✦ ✦ ✦

CONSIDERING the life of farm fencing, the bulletin says: "Many woven wire fences are used longer than farmers' estimates (as given) indicate, because they are usually not replaced for some time after they no longer efficiently perform the service desired of them. The kinds of livestock kept and the amount of time that livestock come in contact with the fence also influence the length of life of the fence. A fence along a lane or around a permanent pasture field will probably not last as long as the same kind of fence around a regular crop rotation field. Other factors, such as method of construction, number and condition of posts used, care given the fence and adaptability of the fence to the job also influence the length of life of any fence."

✦ ✦ ✦

MOST corner posts in use are wood, it was found, but steel and concrete are replacing wood at a rapid rate, especially on farms where no native wood is available. On the 48 farms there was an average of 23 corner posts per farm or one corner post for every 69.83 rods of "owned" fence. Line posts averaged 1,310 or one post per 1.21 rods of fencing on these farms.

✦ ✦ ✦

AN important contribution to the expansion of sales of fencing is embodied in the discussion of "temporary fences." This use of fences is a comparatively new practice in the fencing program of most farms, says the bulletin. Use of steel posts and light woven wire fences has made it possible, it is pointed out, to construct an efficient temporary fence for any kind of livestock at low cost and with minimum amount of labor.

"TEMPORARY fence" says the bulletin, "has proven practical in hogging corn, in utilizing temporary and emergency pastures and in providing clean ground for hogs. The same roll of fence may be used to enclose a temporary pasture for a part of the season and for hogging corn for part of the season. Use of steel line posts makes it possible to move a temporary fence readily."

✦ ✦ ✦

THE bulletin, No. 423, is authored by Professors E. C. Young and F. V. Smith. Its title is "A Study of Farm Layout in Indiana."

✦ ✦ ✦

50 Tons of Copper Wire For Clock Motor Coils

OVER 100,000 pounds of copper wire of approximately the diameter of a human hair will be used by the Warren Telechron Company in Ashland, Mass., in the construction of coils for its synchronous electric clocks this year.

✦ ✦ ✦

THIS wire, which averages about 28,000 feet per pound, adds up to a total running length of 3,016,000,000 feet and if stretched out in a single length would encircle the globe 23.2 times.

✦ ✦ ✦

Micromax Frequency Controller

A NEW Micromax frequency controller — industrial type now provides the isolated generating plants with automatic control of frequency which heretofore has been thought feasible for large central stations on interconnected systems.

✦ ✦ ✦

IN one compact case is combined the well-known Micromax frequency indicator and recorder with an automatic controller, a simple, relatively inexpensive arrangement which omits the refinements necessary for large central stations on interconnected systems.

✦ ✦ ✦

TO receive a copy of the new 8-page booklet describing this new controller, simply write to Leeds and Northrup Company, 4934 Stenton Avenue, Phila., Pa.

DIAMOND POWDERS MAY LOOK ALIKE — BUT THE MICROSCOPE SHOWS A DIFFERENCE —

SMIT Diamond Powders are graded in sizes from No. 1 to No. 6 by a particle size analyzer so that the fragment sizes are uniform and perfectly adapted to the work for which they are selected.

—— We Invite Your Inquiries ——
Fine Raw Material — Uniform Size — Sharp Cutting Grains

J. K. SMIT & SONS, Inc.
157 Chambers St., N. Y. C.
968 Farmington Ave., Hartford, Conn.
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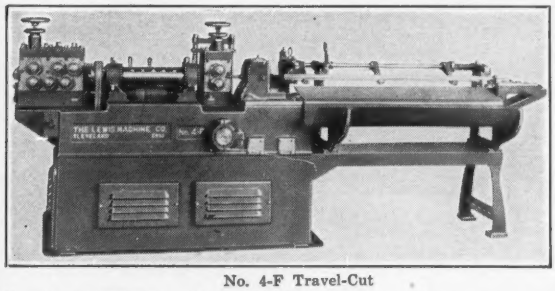
LEWIS Wire Straightening and Cutting Machines
— Automatic—High Speed—Heavy Duty —



No. 4-F Travel-Cut

Machines to Handle 1/32" to 3/4" Rod
Round - Square - Flat - Hex
Ferrous and Non-Ferrous

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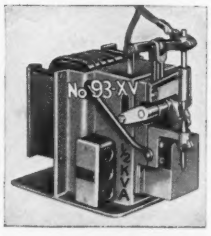
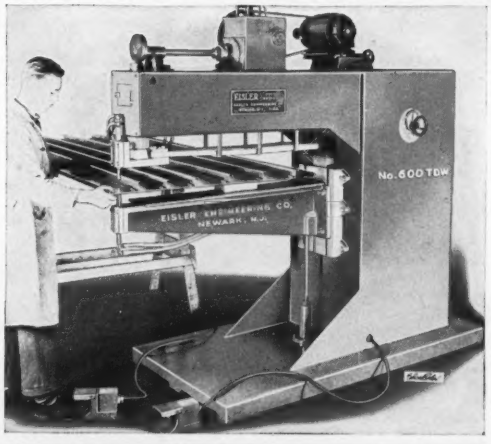
WE CAN SUPPLY AND ENGINEER OUR TOOLS EQUIPPED WITH CARBOLOY CEMENTED CARBIDE

THE LEWIS MACHINE CO., 3440 E. 76 ST., CLEVE., O.

Bench Spot Welder Foot Operated





We manufacture Electric Welders from 3/4 to 500 KVA. Special and Standard Types. WE MAKE A VERY LARGE VARIETY of Welders. Why not ask for more information or a catalog?

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INVENTIONS — PATENTS

Interesting booklet, **General Information Concerning Inventions and Patents** and **Schedule of Government and Attorneys' Fees,** sent free on request. Simply ask for "booklet" and "fee schedule".

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438 Bowen Bldg. Washington, D. C.

Learn about PARALAN

Paralan will give your finished wire and wire products protection from atmospheric corrosion in the mill and in shipping. Paralan-coated wire can be spot welded or soldered without cleaning. Also, Paralan leaves surfaces in good condition for all types of finishes—enameling, japanning, lacquering, plating, etc.

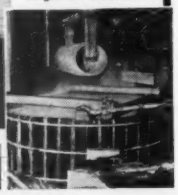
Write for further information. We may be able to solve your difficulties.

AMERICAN LANOLIN CORP.
LAWRENCE, MASSACHUSETTS

NO JOINTS OR SEAMS · NOT A LINING

Haveg molded plastic tanks can be made in one piece as large as 10' long or 9' in diameter. Haveg tanks are acid resistant throughout.

HOT or COLD—Haveg is unaffected by temperature changes and can be used continuously at temperatures as high as 265° F.



Here are a few actual Haveg pickling tank installations. Haveg is unaffected by most pickling acids—is tough —Strong—Durable.

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Stamford Trust Co. Bldg. Stamford, Conn.

Of Interest to Wire Exporters

(Continued from Page 276)

us in our running of the export markets. It is now very hard to have to write to say that the American manufacturers are not carrying out their promise and it does appear to us to be perfectly ridiculous because they themselves must be losing a lot of money and their unnecessary competition is also costing us a lot of money because we are determined to meet them in whatever market we find them and so you will conclude that here are two nations unnecessarily throwing money at wire consumers who are laughing as hard as they can putting this money in their pockets and not making any difference in the selling price of their products. We have only just recently in South Africa had a very illuminating example of today American competition. We have had an account in that country for fifteen years and have been obtaining a price of £30. per ton C. I. F. Durban for this particular class of wire. Some smart American set up has come along and quoted our friends £21. per ton C. I. F. Durban. Where they get these prices from, goodness alone knows, but they have thrown £9. per ton at our customer and forced us to reduce our price by a similar margin. At equal prices we shall always get the business, and we have cabled out that we will meet the American competition. All this has happened mind you since the American manufacturers gave us their word that they would agree to our prices and quotas. We might tell you that this does not only apply to wire as other branches of the Iron and Steel Industry in this country and on the Continent have similar complaints.

"Do you know a Mr. Todd because he is a gentleman I am very sorry for. He came over to this country to conclude negotiations on behalf of the American manufacturers and these negotiations were concluded, and as I have illustrated to you, the agreement has now been broken and Mr. Todd is in a very invidious position. He is certainly a fine straight-forward gentleman and as I say from what I know of the trade, he must be a very disappointed man today, because he has put endless work into these negotiations and it is a great pity that once they were finalized they were afterwards broken.

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✦ ✦ ✦

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✦ ✦ ✦

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'Round the World With the Wire Industry

(*Continued from Page 280*)

IT is interesting to note that Russia bought large quantities of wire ropes in Germany last year and continues to do so. With 1.557 tons (405 in 1937) Russia has been the largest buyer of wire rope in Germany, principally of ropes of more than 2" circumference. Italy was the second largest buyer, taking 1.128 (1.334) tons. Russia buys and specifies only high grade ropes. Exports of wire netting and of wire mesh have also been increased to Russia, whereas in all other products Russia took virtually nothing.

✦ ✦ ✦

ON the domestic market wire and wire products are in heavy demand, where as wire nails were slow in January, while wire netting and wire mesh continue to be in great demand so that some works have already been forced to close their order books. The export demand is quiet, only wire nails being best sellers.

✦ ✦ ✦

THE Polish wire nail and wire cartels try to appoint agents abroad, in London, Rotterdam, Hamburg and also some Overseas markets which may indicate that the Polish industry is inclined to extend her export trade. The allotment question has not yet been definitely squared up with the IWECO.

✦ ✦ ✦

WIRE netting has less in demand on almost all export markets, except for rectangular pig and cattle netting in various sizes of mesh which are still in demand. Prices however are well maintained International competition is not very heavy just at the moment.

✦ ✦ ✦

GERMANY exported 15.556 t wire in January, 1939 as compared with 9.928 tons in January, 1938 and February exports were 14.227 t (10.128 t). In this figure Austria is included in about 7% of the total in 1939 (not yet in 1938).

✦ ✦ ✦

THE German production capacity of wire and wire products will be raised by the inclusion of Bohemia by approx. 9.500-10.000 t monthly. The industry was operating at about 70% of the above figure. The export quota was about 35% of the production.

✦ ✦ ✦

1.057 tons of aluminum wire were exported in 1938 as compared with 265 tons in 1937, 4.525 tons of copper wire (4.913 in 1937), 5.494 tons of brass wire (6.620 t) and 781 tons of copper and brass wire strand. The export figures to Oversea declined, but were improved to European markets.

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Sleeper & Hartley, Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y. Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY— Special — Combination Machine for Drawing, Cutting-to-length. Straightening and Reeling Bars from Coil in One Operation (Shumag Type)—
W. A. Schuyler, New York, N. Y.

MACHINERY—Spooling
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., The, Cleveland, O.
National Machinery Exchange (Used), New York, N. Y.
H. J. Ruesch Machine Co., Newark, N. J.
W. A. Schuyler, New York, N. Y.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Stranding
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Taping
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing Size of Wire
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Welding Wire
Eisler Engineering Co., Inc., Newark, N. J.
F. B. Shuster Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Winding
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
Aetna-Standard Engineering Co., Youngstown, O.
American Insulating Mach'y. Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.

WHERE TO BUY, Continued

W. A. Schuyler, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.

MACHINERY—Wire Rope
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MACHINERY—Wrapping Wire
W. A. Schuyler, New York, N. Y.

MILLS—Tandem Rolling and Edging
Torrington Mfg. Co., The, Torrington, Conn.

MOTORS—Electric
Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Insulating
E. W. Twitchell, Inc., Phila., Pa.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS
American Chemical Paint Co., Ambler, Pa.

PIPING AND FITTINGS—Acid Resistant
Duriron Co., Inc., The, Dayton, O.
Haveg Corp., Newark, Del.

POTS—Lead Melting
John Robertson Co., Brooklyn, N. Y.

PRESSES—Hydraulic and Mechanical
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead
John Robertson Co., Brooklyn, N. Y.

PULLERS—Wire
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
John Robertson Co., Brooklyn, N. Y.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
Apco Mossberg Corp., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Steel
Apco Mossberg Corp., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Takeoff
Apco Mossberg Corp., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

REELS AND SPOOLS—Shipping and Shop
Apco Mossberg Corp., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Vulcanizing and Impregnating
Apco Mossberg Corp., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products, Co., Niles, O.

REELS—Wire Drawing
Apco Mossberg Corp., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products, Co., Niles, O.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS
Carl-Mayer Corp., The, Cleveland, O.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.

RODS—Wire—Steel
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.

RUST PROOF COMPOUND—
American Lanolin Co., Lawrence, Mass.

SHEET—Steel
Continental Steel Corp., Kokomo, Ind.

SKIN PROTECTOR—
Magnus Chemical Co., Garwood, N. J.

SOAPS—Industrial and Wire Drawing
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Homer, N. Y.

SPOOLS—Annealing and Wire Drawing
Apco Mossberg Corp., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Chicago, Ill.

SPOOLS—Shipping and Shop
Apco Mossberg Corp., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Chicago, Ill.

SPOOLS—Steel
Apco Mossberg Corp., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

STAMPINGS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Brass and Non Ferrous
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

STRIP—Steel
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.

SWIFTS—Take-off
Apco Mossberg Corp., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Pickling
Haveg Corp., Newark, Del.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

TOOLS— Wire Cutting
Porter, H. K., Inc., Everett, Mass.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS—
H. J. Ruesch Machine Co., Newark, N. J.

VALVES AND FITTINGS—Acid Proof
Duriron Co., The, Dayton, O.
Haveg Corp., Newark, Del.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y. Co., Phila., Pa.

WELDERS—Spot and Butt
Eisler Engineering Co., Newark, N. J.

WIRE—Cold Heading
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Enameled For Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Non Ferrous to Specification For Special Purposes
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

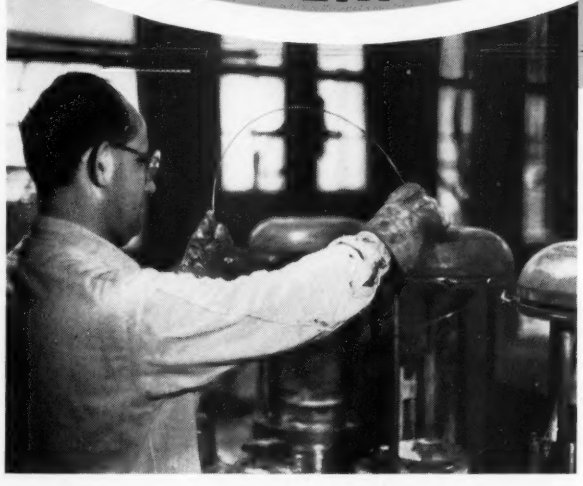
WIRE—Spring
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Stainless Steel
Firth-Sterling Steel Co., McKeesport, Pa.

WIRE—Steel—Also Coppered Steel——Also Galvanized Steel
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE AND STRIP—Zinc
Metal Industry Works, Poland.
Platt Bros. & Co., The, Waterbury, Conn.

THE SUPERINTENDENT LOOKS AT PRODUCTION



Experienced executives favor Morgan equipment for modern wire mill requirements. Morgan-Connor Continuous Wire Drawing Machines, with their exclusive air cooling units and high block features, assure ✓ continuous drawing at top speed of high or low carbon stock with maximum ✓ safety. They ✓ save time on die threading and permit ✓ butt welding without shutting down. In all Morgan machines, sound design and rugged construction are big factors in maintaining quality, production, and profits at a high level.

Continuous Wire Drawing Machines; Take-up Frames; Horizontal Bull Blocks; Vertical Spindle Bull Blocks; Reels; Pointers; Motor Drives; Wire Mill Accessories.

MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS, U. S. A.

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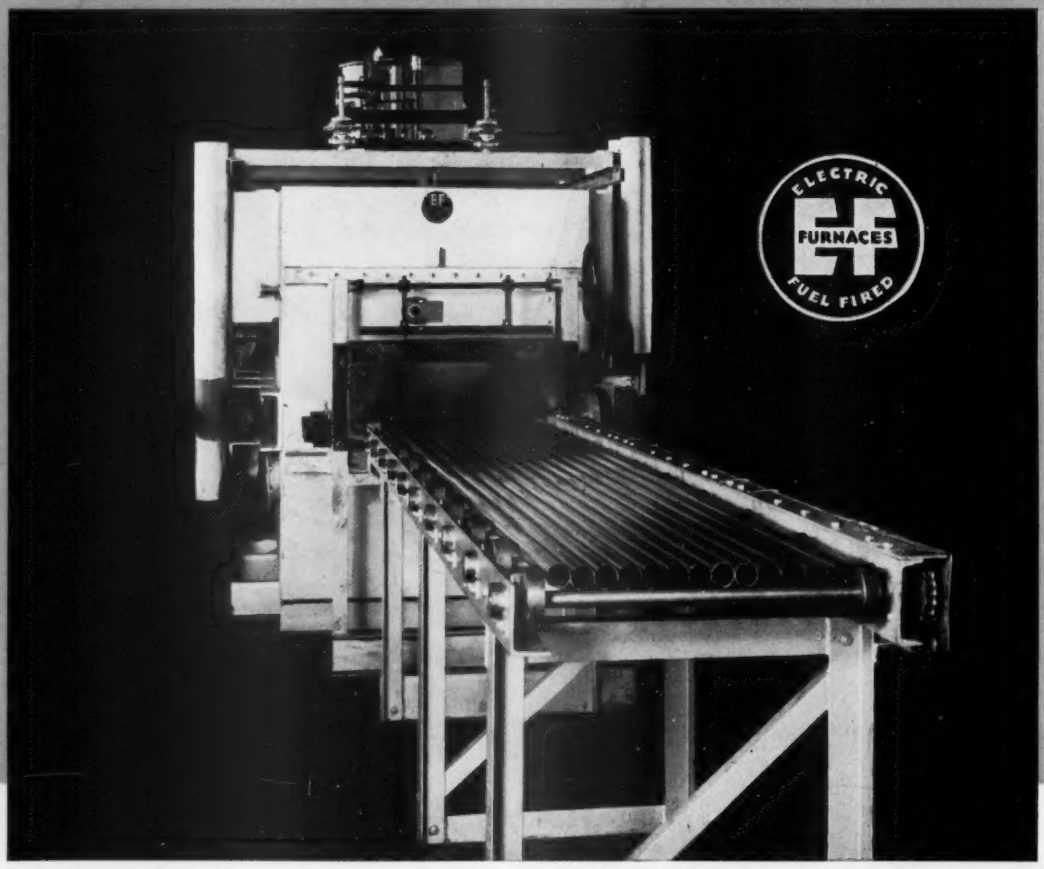
MORGAN WORCESTER ENGINEERS AND MANUFACTURERS.

MORGAN *Wire Drawing Machinery*

BRIGHT ANNEALING TUBING



Bright annealed tubing — uniform in finish and anneal — is produced, continuously, in the above EF gas fired recuperative type radiant tube special atmosphere furnace.

This is one of several sizes and types of electric and fuel fired furnaces we have built for bright annealing ferrous and non-ferrous tubing in both coils and straight lengths. We build them in sizes for any production.

Send for data on this and other interesting installations.

Other EF controlled atmosphere installations include furnaces for bright and clean annealing various ferrous and non-ferrous products including wire, strip, sheet, stampings and other products — furnaces for copper brazing, scale-free heat treating and annealing without scale or decarburization, as well as furnaces of various types for normalizing, short cycle malleableizing, nitriding, carburizing, billet heating, heating for forging and other processes.

Submit your furnace problems to EF engineers.

We build Gas Fired, Oil Fired and Electric Furnaces—For any Product, Process or Production.

The ELECTRIC FURNACE Co.

ELECTRIC & FUEL FIRED *Furnaces*

SALEM, OHIO